ABSTRACTS

K1

Plenary Session

Monday, 8:30am-9:35am Room: Baie des Anges

Chair: Rob Hyndman
Monash University, Clayton, Australia

Mining the past to determine the future: Problems and possibilities

David J. Hand
Imperial College, London, UK

Technological advances mean that vast data sets are increasingly common. Such data sets provide us with unparallelled opportunities for modelling, and for predicting the likely outcome of future events. But such data sets may also bring with them new challenges and difficulties. Awareness of these, and of the weaknesses as well as the possibilities of these large data sets, is necessary if useful forecasts are to be made. This talk looks at some of these difficulties, illustrating with applications from a range of areas

David Hand is Head of the Statistics Section in the Mathematics Department and Head of the Mathematics in Banking and Finance programme of the Institute for Mathematical Sciences at Imperial College London. He studied mathematics at the University of Oxford and statistics at the University of Southampton. His most recent book is *Information Generation: How Data Rule Our World*. He launched the journal *Statistics and Computing*, and served a term of office as editor of *Journal of the Royal Statistical Society, Series C*. He was President of the International Federation of Classification Societies for 2006 and 2007, and is President of the Royal Statistical Society for 2008 and 2009. He has received various awards and prizes for his research, including the Guy medal of the Royal Statistical Society, a Wolfson Research Merit Award from the Royal Society, and an Outstanding Contributions Award from the IEEE International Conference on Data Mining. His research interests include classification methods, the fundamentals of statistics, and data mining, and his applications interests include medicine and finance. He acts as a consultant to a wide range of organisations, including governments, banks, pharmaceutical companies, manufacturing industry, and health service providers.

NN1

Contributed Session: Empirical Evaluation of Neural Networks

Monday, 09:40am-10:40am Room: Baie des Anges

Chair: Michèle Hibon
INSEAD, France

The NN3 competition: Results, Conclusions and Implications for automated Artificial Intelligence approaches

Konstantinos Nikolopoulos
Manchester Business School, UK

Sven Crone
Lancaster University Management School, UK

Michèle Hibon
INSEAD, France

During 2007 an empirical evaluation of Artificial Neural Networks (ANN) and other methods of Computational Intelligence (CI) was conducted through the NN3 competition. The competition aimed to resolve two research questions: (a) what is the performance of CI methods in comparison to established forecasting methods? and (b) what are the current ''best practice'' methodologies utilised by researchers to model CI and especially ANN for time series forecasting. The NN3 competition evaluated the ex ante accuracy of forecasting 18 steps ahead on two homogeneous sets of 111 or 11 time series of varying length and time series patterns on multiple established error metrics; conditions examined include the presence of seasonality as well as the length of the series under examination. The final results suggest that CI methods can very well do the job, and perform outstandingly in batch-time-series forecasting tasks; a variety of ANN topologies, learning algorithms, as well as non-ANN AI approaches have being quite successful.

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The problem of replicating Neural Network studies – a sensitivity analysis on replication attempts of the Hill, O'Conner and Remus study

Sven Crone
Lancaster University Management School, UK

Neural networks (NN) have received increasing attention in time series forecasting, with over 5000 ISI SCI referenced publications in computer science, engineering and management. Of the most encouraging results in Management Science, the studies by Hill, Marquez, O'Connor et al. (1994) and Hill, O'Conner and Remus (1996) are among the most highly cited. Despite their valid and reliable experimental design, analysing the conditions under which NN perform well against established statistical benchmarks, the optimistic results of NN on quarterly and monthly time series have raised scepticism from the peculiar technical setup of learning rates and early stopping rules. Furthering the concern on the validity and reliability of the results, the experiments have withstood recent replication attempts by Zhao, Collopy and Kennedy (2003) using the original software and data. Despite a consensus among researchers that replication studies are vital in advancing scientific knowledge, additional replications in forecasting are negligible, and none have been conducted on NN in time series prediction. As many of the modelling choices explicitly or implicitly made by Hill et al. were not documented sufficiently to allow replication, we extend the replication attempts of Zhao et al. and explore the sensitivity of the modelling choices across all meta-parameters. While we can confirm Hill et al.'s conclusion that NN provide a good approach to extrapolating nonlinear and discontinuous series, we identify methodological problems from the random weight initialisations that may prohibit replications of NN studies in general, not only on time series data. In addition, we provide evidence under which conditions NN methodologies perform well on the M-competition data.

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Forecasting the monthly tonnage of demolished tankers using Time Delay Neural Networks (TDNN) and multivariate analysis methods

Farshid Khalili
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Scrap steel is the main reason for the demolition of a tanker and it has the highest percentage amongst the other elements. Forecasting the tonnage of the demolished tankers is essential for investors and environmental policy makers. Investors and financial decision makers want to be able to predict the tonnage to aid financial planning. It is also important to predict the monthly tonnage so that environmental policy makers can employ adaptive management to changes in the market and act upon environmental concerns and thereby minimise the environmental impacts of tanker demolition. However, the identification of the main inputs that can alter the trends is complicated because of the range and complexity of variables, which have an influence on the tankers demolition. This research aimed to model the tonnage of monthly demolished tankers and forecast its short-term trend. In this way, several conventional multivariate analysis methods, including MLR, PCR and PLS, have been employed to produce an accurate model and predict the monthly tonnage. Subsequently, same inputs have been used to create both static and dynamic ANN models and forecast three months ahead. Static ANNs have been used to identify the most sensitive and influential inputs and various TDNN architectures, with different tap delay lines, have been created and used to find out the most accurate model for the prediction. The error for each obtained model has been measured and validated, in terms of MSE, and it has been proven that the ANN methods are more accurate than the multivariate methods.

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ENR10

Invited Session: Portfolio Optimization and Load Forecasting

Monday, 09:40am-10:40am Room: Clipper

Chair: Sandrine Charousset
Electricité de France, France

Price impact on energy demand

Corine Pancer, Emilio Di Meglio, Sophie Blanchet
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Understanding the impact of prices on energy demand is an important issue today in particular to provide accurate long-term forecasts. The reaction of the consumers can be very difficult to understand and to model. It is influenced by prices but also by technology, equipment, and policies changes and may also depend by environmental considerations. Consumers do not react immediately to these different changes, they must anticipate to decide whether a change of habit or an investment may be profitable. Moreover they may not consider the prices as continuous and adapt their consumption proportionally to the variations of prices. The reaction of energy consumption to prices is thus complex and difficult to sum up in a few equations. Several approaches are possible to try to understand the relations between prices and demand in energy. We will focus in this paper on translog model, our final aim is to estimate direct and substitution elasticity to prices. Results of model application on French residential and industrial sectors are shown.

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A model to simulate hydraulic inflows for France

Jérôme Collet, Patrick Coudray
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EDF has energy stocks whose management is defined annually. To evaluate these management strategies one needs stochastic models to simulate the hazards that affect these strategies. We investigate here the water inflows in EDF plants, or more precisely their sum throughout France. We have daily data since 1948. Their analyses as well as the expertise of hydrologists show 3 important features. If we start the year on September 1st, we can assume the years independent of each other, since September 1st, most water stocks are at their lowest. In winter, part of the inflows is snow, which melts during the summer; so inflows in winter and summer are linked. There is a link between temperature and inflows, and this link is seasonal. To summarize the correlations of the inflows within the year, we perform a PCA. The 2 first components summarize the already seen interactions between winter and summer. The inertia of the 2 components is about half of the total inertia. Remaining inertia is modeled using an ARMAX model, where the exogenous variable is the temperature. The last step is to validate the model obtained, which involves checking at the same time that the model correctly fits the data, but also that it is capable of generalization. For this, we conduct tests distinguishing estimation period from validation period. A difficult point is that we need to verify the goodness-of-fit between the data and the distribution simulated by the model, while these distributions are conditional (eg. conditional to the temperature). That is why we use systematically Probability Integral Transform, which puts back all data to the U[0;1] distribution.

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EDF's mid-term portfolio optimization

Frédéric Bréant
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The presentation will consist in an overview of EDF's mid-term portfolio optimization and will point out the necessity of a good representation of the uncertainties in decision-makings. EDF power generation facilities in France amounts to a total of 98.8 GW of installed capacity. The wide range of EDF facilities mixes all forms of energy: nuclear, thermal, hydraulic and other renewable energies. Depending on the period of the day and on the season of the year, the load demand oscillates between some 40 000 and 90 000MW. The first part of the presentation will deal with the different decisions taken by mid-term power generation management at EDF. Three main goals can be underlined: calculation of hydraulic reservoirs management strategies for short-term unit commitment, since it only uses two days of data and needs indicators not to use to much water; maintenance scheduling of nuclear plants; definition of an order of magnitude of the supply and demand balance for the few following years on many scenarios of uncertainties by calculating indicators on coal, fuel oil and gas volumes, margins and marginal costs. Those indicators are precisely looked at for financial and physical risk hedging. The second part of the presentation will underline the important role of uncertainty generators to create realistic scenarios for each type of uncertainty: demand, generation units availability, hydraulic inflows, spot market prices and quantities that can be bought or sold on the electricity market. Those uncertainty generators are highly dependant of one variable: temperature. For instance, the impact of cold weather is straight to demand and market prices. Risk hedging is mostly concerned by this type of event and to have at one's disposal reliable cold waves scenarios is of great interest to make the best financial and physical decision.

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EBC16

Invited Session: Bankruptcy Predictions and Macroeconomic Developments

Monday, 09:40am-10:40am Room: Fregate

Chair: Olivier de Bandt
Banque de France, Paris, France

Macro stress testing with a macroeconomic credit risk model for the French manufacturing sector

Caroline Jardet, Sanvi Avouyi-Dovi, Ludovic Kendaoui, Jérémy Moquet
Banque de France, Paris, France

The aim of this paper is to develop and estimate a macroeconomic model of credit risk for the French manufacturing sector sector. Our approach is similar to Wilson's CreditPortfolioView model (1997a, 1997b). The model is used to simulate loss distributions of a credit portfolio for several macroeconomic scenarios. We implement two different simulation procedures: in the first on the firms are assumed to have identical default probabilities; in the second procedure, we take into account individual risk when the default probabilities are assessed. The empirical results indicate that these simulation procedures lead to quite different loss distributions. For instance, after a negative one standard deviation shock on output, the maximum loss occurring with a probability of 99% lies between 2.42 and 3.08 % of the financial debt of the French manufacturing sector

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House prices and bank distress: Should we also care if there's no bubble?

Tigran Poghosyan, Michael Koetter
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Although the negative impact of housing price bubbles on banking system stability is obvious, the relationship between real estate markets without signs of overheating and bank distress is a priori unclear. Higher house prices increase the value of collateral, which reduces bank risks. However, higher prices may also indicate deviations from fundamental values, thereby increasing probabilities of bank distress (PDs). We test these competing hypotheses for German universal and specialized mortgage banks between 1995 and 2004. Increasing price-to-rent ratios are found to be positively related to bank PDs and larger real estate exposures amplify this effect. Rising real estate price levels alone, in turn, reduce bank PDs, but only for banks with large real estate market exposure. This suggests a positive, but relatively small "collateral" effect for banks with more expertise in specialized mortgage lending. The multilevel logistic model used here further shows that real estate markets are regionally segmented and location-specific effects contribute significantly to predicted bank PDs.

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Macroeconomic Fluctuations and Corporate Financial Fragility

Olivier de Bandt, Widad El Amri
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Catherine Bruneau
Université Paris 10, Nanterre, France

Using a large sample of accounting data for non financial companies in France on the period 1991-2004, the paper studies the interactions between macroeconomic shocks and companies' financial fragility. We consider in particular both whether firms' bankruptcies are affected by macroeconomic variables, and whether bankruptcies determine the business cycle.We estimate forecasting equations using Schumway's (2001) approach as well as the joint dynamics of defaults and macroeconomic variables. We illustrate how the model can be used for stress testing.

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FIN13

Invited Session: Financial time series

Monday, 09:40am-10:40am, Room: Le Gallion

Chair: Mike K. P. So
Hong Kong University of Science and Technology, Hong Kong

Basket trading under cointegration with logistic mixture autoregressive noise

P. L.H. Yu, X. Cheng, W.K. Li
University of Hong Kong, Hong Kong

In this talk, we introduce a cointegration model with logistic mixture autoregressive (LMAR) noise, in which the equilibrium relationship in financial market can then be modelled in both rational market and chaotic market with different market volatility levels. First of all, the conditions for stationarity of the LMAR model is given and proved. Then a 2-step estimation procedure combining least square method and EM algorithm is proposed. Simulation studies show that this 2-step estimation procedure is computationally efficient in estimating the model parameters. The proposed LMAR model is applied to basket trading based on various strategies. The LMAR noise structure gives flexibility to index tracking strategy, and identifies better profit in pair-trading strategy.

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A New Method for Estimation and Forecasting with Noisy Realized Volatility

Manabu Asai
Soka University, Tokyo, Japan

Michael McAleer
University of Western Australia, Australia

Marcelo Medeiros
Pontifical Catholic University of Rio de Janeiro, Brazil

Several methods have recently been proposed in the ultra high frequency financial literature to remove the effects of microstructure noise and to obtain consistent estimates of the integrated volatility as a true measure of daily volatility. Even bias-corrected and consistent realized volatility estimates of the integrated volatility can contain residual microstructure noise and other measurement errors. Such noises are called as the "realized volatility (RV) errors", which should not be ignored. Thus, we need to take account of such measurement errors in estimating and forecasting integrated volatility. This paper proposes a new approach for estimating integrated volatility by removing the effects of realized volatility errors. A K-component and long memory models are considered for the integrated volatility, and their estimation procedures are proposed. Monte Carlo simulation experiments are presented to investigate the effects of RV error. The alternative correction of R-squared is proposed for evaluating the forecasts. An empirical example is used to demonstrate that neglecting RV error can lead to serious bias in estimating the integrated volatility, and that the new method can eliminate the effects of the microstructure noise. Empirical results also shows that the suggested correction for R-squared is needed in most of the cases.

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On a Threshold Multivariate GARCH Model

Wing Han Iris YIP, Mike K. P. So
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This paper proposes a threshold multivariate GARCH model (Threshold MGARCH) which integrates threshold nonlinearity, mean and volatility asymmetries and time-varying correlation in financial markets. The main feature of this model is that the mean, volatility and time-varying correlation can be governed by different threshold variables with different number of regimes. Estimation is performed using Markov Chain Monte Carlo methods. Forecasts of volatility and value at risk can be generated from the predictive distributions. The proposed methodology is illustrated using both simulated and actual international market with high dimensional data.

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EBC6

Contributed Session: Business Surveys III

Monday, 09:40am-10:40am Room: Le Mistral

Chair: Christelle Minodier
INSEE, France

Maximum likelihood estimation of hierachical factor models: An application to sectoral business survey data

Claudia Cicconi
Rome, Italy

When dealing with structured data, the assumption of weak cross-sectional correlation among idiosyncratic components can be weak and the cross-section dimension too small in practice to make the negative effects on the estimation die out. The idea of this paper is to model the cross-correlation among the idiosyncratics by means of a hierarchical model where, beside the common factors, also some block specific factors are considered. The hierarchical model is estimated by ML and exploits recent results on the estimation of factor models with n large. Doz, Giannone and Reichlin (2006) have shown that ML estimation of factor models is computationally feasible also when n is large and propose a consistent QML estimator of the common factors. These results are very important for the estimation of hierarchical models since ML allows to impose ad hoc restrictions on the parameters and therefore to exploit the structure of the data. In addition, a Monte Carlo exercise is performed to measure the efficiency gains deriving from explicitly modeling the cross-correlation of the non-common factors. The simulations results show that the advantages of using hierarchical models are relevant in terms of efficiency in small samples. The model is applied to Italian sectoral business survey data concerning the five variables used to estimate the Business Confidence Indicator (BCI). The estimated common factor is then used to forecast the industrial production. The real time forecasting exercise shows that this indicator does not outperform the BCI, nor simpler indicators. The gains from modeling the hierarchical structure seem then to be limited in practice, probably because n is sufficiently large relative to the amount of cross-correlation embodied in the hierarchical structure itself. However, the hierarchical model provides interesting variance decomposition results and, as by products, sectoral and variable specific indicators whose informational content could be potentially relevant.

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The Good, the Bad and the Ugly: Analyzing Forecasting Behavior within a Misclassified Quantal Response Framework

Ingmar Nolte, Sandra Nolte, Winfried Pohlmeier
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Abtract: This paper presents a structural approach to analyze qualitative forecasting errors at the in-dividual level made in business tendency surveys. Based on a quantal response approach with misclassification we are able to define the qualitative mispredictions of forecasters in terms of deviations from the qualitative rational expectation forecast and relate them to individual and macro factors driving these individual mispredictions. Our approach is novel in various dimensions. Through the introduction of a dynamic, Markov type of misclassification matrix our approach accounts for individual heterogeneity in forecasting behavior. It enables the detailed analysis of individual forecasting decisions allowing determining individual and economy wide parameters influencing the individual expectation formation process. Moreover, it generalizes the conventional probability approaches in the tradition of Carlson and Parkin (1975) by including the time series information from the macro level as well as individual dynamics by exploiting the panel structure of business tendency survey. The merits of our approach are twofold: First, the model can be used to test for behavioral aspects of individual forecasting (learning, rational expectations, focalism etc.) using business tendency data. Second, it can be applied in a nonstructural fashion as a pure forecast-ing tool exploiting the information on individual mispredictions and improving upon the Carlson-Parkin model being included as a nested specification. The model is estimated by maximum likelihood using a logistic generalized ARMA structure for the misclassification matrix based on the Financial Markets Survey of the Centre of European Economic Research, a monthly qualitative survey of around 330 financial ex-perts, giving six-month-ahead predictions of major macroeconomic aggregates and financial indicators. We compare the out-of-sample forecasting quality of our approach with forecasts obtained by conventional quantification methods and standard time series approaches using the Diebold-Mariano test and the Superior Predictability test. Our approach outperforms the alternative approaches for several variables. Moreover, our estimates provide a clear interpretation on the sources of misprediction that lead room for misclassification corrected forecasts.

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A Monthly Indicator of the French Business Climate

Christelle Minodier, Laurent Clavel
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Business tendency surveys carried out by national statistical institutes are intensively used for the short-term forecasting of the economic activity. The available set of survey variables is very large. Calculating Composite Indicators (CIs) may provide a suitable summary, by extracting the common trend and removing any undesirable "noise" from very numerous data. To complete the existing panel of CIs we provide in this paper the first composite indicator based on French business surveys covering all important economic sectors of the French economy. We choose the dynamic factor analysis to deal with mixed and changing frequencies (monthly, bimonthly or quarterly) and time availability of the data (since 1976 in the industry, since 1988 in services). Parameters are estimated by maximum likelihood based on the Kalman filter. This new monthly synthetic indicator allows a clear interpretation of all the business surveys and it delivers an early quantitative message concerning the current business climate in France. This indicator can also be used to improve GDP growth forecast. Two approaches are considered: using either the sector-based CIs or the elementary components used in the construction of these sector-based CIs. To validate our results and evaluate their real-time performance we run some out-of-sample forecast tests on GDP growth. We also check their stability and their ability to detect business cycle turning points as estimated by Bry and Boschan's (1989) non-parametric dating method.

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JUD3

Contributed Session: Judgmental and Scenario Forecasting III

Monday, 09:40am-10:40am Room: Les Courants

Chair: Magne Jorgensen
Simula Research Laboratory, Lysaker, Norway

Dialogic Forecasting: Implications and Opportunities for Evidence-based Practice

Kazem Chaharbaghi
University of East London, UK

Dialogic forecasting can be considered as both a philosophical stance as well as a process which involves a dialogue or exchange between different perspectives. Dialogic forecasting is based on the supposition that forecasts are essentially human constructions, that is, they are based on assumptions and expectations. The effectiveness of a given forecast depends on the situation or context that makes its underlying assumptions and expectations valid or invalid. As forecasts are human constructions, forecasting can involve competing perspectives, none of which is sacrosanct. Recognition of the fundamental differences between dissimilar perspectives matters as each perspective enables seeing something that would otherwise escape attention. In other words, a way of seeing is also a way of not seeing. In forecasting, the diversity of perspectives is important because it is not possible to reduce a multi-dimensional world to a one-dimensional perspective. Within this context of multi-dimensionality, although much has recently been made of evidence-based practice, little attention has been paid to the multiplicity of evidence that is required in making fully informed forecasts. In evidence-based practice, critical and evaluative evidence, for example, is as important as empirical and statistical evidence, as are the voices of the many as well as the voices of the few. To reduce the evidence-base to a singular forecasting perspective is to rely on partial, incomplete evidence and by implication limit the depth and breadth of understanding. Although this paper represents a limited sample of diverse forecasting perspectives, it nevertheless provides an insight into the nature of this heterogeneity. In forecasting, such heterogeneity not only grows the capacity of forecasters to see but also increases their power to change.

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Forecasting the incidence of the favourite-longshot bias in a market for state contingent claims

Johnnie Johnson
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Alistair Bruce, Jiejun Yu
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The favourite-longshot bias, whereby the prices of favourites/longshots in horseraces tend to under/over-represent their chances of success, has remained a persistent feature across time, countries and different market forms. The biased pricing of assets, represented by the favourite-longshot bias, requires explanation because a large body of evidence supports the notion of efficiency in financial markets, which implies that market participants use information in an appropriate manner to price assets. Numerous studies have tried to explain the phenomenon but these fail to predict in which markets it is most likely to occur. In this paper we develop a model to explain the differential incidence of the favourite-longshot bias in parallel sectors of the pari-mutuel horserace betting market. Hypotheses are derived from the model and these are tested, using UK data, to explore the origins of the bias, which in turn help to pinpoint those markets where it is most likely to occur. Significant variations in the bias are discovered between different market sectors. The results shed light on competing demand-side explanations for the favourite-longshot bias and suggest that a model incorporating a combination of behavioural and operational features of the markets and the types of bettors which they attract 8is needed to predict where the bias will occur.

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Human Biases in Forecasting of Work-Effort: Differences in Effect Sizes in Laboratory and Field Settings

Magne Jorgensen, Stein Grimstad
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A frequently reported reason for IT-project failures is the inability of software professionals to provide accurate work-effort forecasts. Inaccurate work-effort forecasts lead to poor investments, unrealistic plans and unsatisfactory software quality. Software development work-effort forecasts are typically based on judgmental forecasting processes vulnerable to human biases. The information about a client's unrealistic, low cost expectation has for example been found to lower the work-effort forecasts provided by software professionals, even when the professionals are informed about the irrelevance of that information. Previous studies on work-effort forecasting biases are based on more or less artificially created (laboratory) situations with characteristics likely to increase the use of surface indicators. The high forecasting time pressure of many laboratory experiments may, for example, increase the use of easily available, surface information deliberately introduced by the experimenter to manipulate the forecasts. This lack of controlled experiments on work-effort forecasting biases in field settings led us to design the presented study, with the goal of assessing the robustness and effect sizes of previous findings in typical software development work-effort forecasting field settings. We invited forty-six software development companies from different European and Asian countries to forecast the work-effort of the same five projects in typical forecasting conditions. The companies were randomly allocated to a group that received manipulated forecasting information, such as unrealistic cost expectations, or a control group. Our main result is that the impact of totally irrelevant information seems to be strongly reduced, although not fully removed in the studied field setting. When, however, the information is relevant for the software development work but nevertheless misleading for the work-effort forecast, the impact in field settings can be large. A possible consequence is that the forecasting process improvement emphasis should be on neutralizing misleading, but relevant forecasting information, and less on removing totally forecasting-irrelevant information.

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MTD7

Contributed Session: Forecasting Methods IV

Monday, 09:40am-10:40am Room: Sirocco

Chair: Leighton Vaughan Williams
Nottingham Trent University, UK

The Progress of the Betting During a Soccer Match

James Reade, Karen Croxson
University of Oxford, UK

In recent years Betfair.com has risen dramatically to become a major player in the sports betting landscape; as a betting exchange it has revolutionised betting, and its online facility has enabled a new innovation in betting - in-running betting during any given sports event. In addition to this, a number of statistical models to describe match outcome probabilities have been proposed, mainly invoking bivariate Poisson-type models for goal arrival. In this paper we extend such models to describe in-running match outcome probabilities, and we use a novel ultra-high frequency sports betting dataset to assess how well the model performs. This model can then be used both for inference, in terms of understanding more about the evolution of sports events, and for prediction purposes. We find that the in-match econometric model fits well the implied probabilities from our online betting data and we assess how the model can then be used to design trading strategies. Additionally we consider the effect of basing model specification on forecast performance based on a training period.

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What insights can prediction markets offer about the electabiliy of US presidential candidate? A case study

Leighton Vaughan Williams
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The 2008 US Presidential election cycle has attracted unprecedented volumes of trading on a variety of markets, including those available during the 'primary' season about the likely Democratic and Republican party nominees. Much of this trading is conducted on person-to-person betting exchanges, the records of which provide a useful source of information for testing a variety of hypotheses about the value of such markets as a forecasting tool. In this paper data is gathered on bets placed during one phase of the election 'primary' season and is employed to provide insights into the electability of candidates in the general election.

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Predicting Elections from Politicians' Faces

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Randall J. Jones
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University of South Australia, Australia

Prior research found voters' assessment of relative competence predicted the outcome of Senate and Congressional races. We hypothesized that snap judgments of "facial competence" would provide useful forecasts of the outcomes of the presidential primaries. We obtained facial competence ratings of 11 potential candidates for the Democrat Party nomination and of 13 for the Republican Party nomination for the 2008 U.S. Presidential election. To ensure that raters did not recognize the candidates, we relied heavily on young subjects from Australia and New Zealand. We obtained between 139 and 348 usable ratings per candidate between May and August 2007. The top-rated candidates were Clinton and Obama for the Democrats and McCain, Hunter, and Hagel for the Republicans; Giuliani was 9th and Thompson was 10th. At the time, the leading candidates in the Democrat polls were Clinton at 38% and Obama at 20%, while Giuliani was first among the Republicans at 28% followed by Thompson at 22%. McCain trailed at 15%. Voters already knew Hillary Clinton's appearance, so her ranking met our expectations. As they learned the appearance of the other candidates, poll rankings moved towards facial competence rankings. At the time that Obama clinched the nomination, Clinton was virtually even on the popular vote (although she lost on the delegate vote) and McCain had already secured the Republican nomination.

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MKG1

Contributed Session: Marketing I

Monday, 09:40am-10:40am Room: Azur

Chair: Tao Huang
Lancaster University Management School, UK

Analysis of Motion Picture Association of America Film Ratings

Ragnar Lesch
Palo Alto, USA

We present an analysis of the ratings of the MPAA given to 3000 motion pictures released in the US since 1995. We look at the rating itself as well as the reasons given by the MPAA for the rating. We were interested in several things: 1."Understanding" the movie rating process: Basically, is the rating consistent and therefore can one predict the rating itself based on the reasons? 2. What are the main drivers for a rating and how consistent over time is the rating or is there a change in attitude? 3. Does the reason given help determining the box office revenue for the movie when just considering the rating information? For the rating reasons we carried out a textual analysis in order to create a small number of text features which then act as the input for the subsequent analysis. The feature extraction includes stop word elimination, synonym replacement and phrase recognition. Based on those we performed a regression analysis to predict the rating and the box office revenue.

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Forecasting market inefficiency via an analysis of the composition of traders in a market for state contingent claims

Ming-Chien Sung, Johnnie Johnson
University of Southampton, UK

This study explores the origins and strength of the weekend effect by examining a market for state contingent claims where this phenomenon has not been explored; the UK horseracing market. Conditional logit models are developed for weekend and weekday markets and prices are shown to be an inferior guide to race outcome at weekends. Evidence is provided that weekend markets are populated by a larger proportion of noise traders and that their inaccurate judgments cause the effect. It is shown that the effect is sufficiently pronounced to enable abnormal returns to be earned in weekend markets.

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Exploring the Value of Promotion Information in Sales Forecasting within a Retailer Context

Tao Huang
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Sales promotions are used by manufacturers and retailers to influence market share and sales. Within the marketing modeling literature, there is a lot of attention that is being paid to obtain better elasticity estimates of promotional activities. Most of this research however tends to pay little attention as to how such elasticity estimates are used for "routine" and "less routine" forecasting purposes. In this research, extrapolative models (e.g. univariate time series models) will be used as the benchmark against some well known market response models in which we incorporate promotion information for forecasting purposes. This allows us to look into the potential contribution of using promotional elasticity effects for sales forecasting as well as to compare the performance of these models with respect to forecasting ability. The research will be based within a retailer setting where we focus on the nature, structure and complexity of the forecasting problems. In contrast to manufacturers, retailers have a wider range of concerns with respect to sales forecasting due to their numerous product lines and large numbers of stores. For example, retailers need to forecast the sales in product dimension: the sales for each Stock Keeping Unit (SKU), brand, or category (a group of products satisfying similar saless, such as 'Beer&Lager'). They may also need to forecast the sales in market dimension: the sales for each store, each geographic trading area, or the whole retail chain, which is consistent with the concept of "think globally and act locally". In this research, we will use two main datasets: The first one comes from a major grocery retail chain in UK and the second one is the Dominick's database from the James M. Kilts Center, GSB, University of Chicago.

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FIN3

Contributed Session: Neural Nets in Finance

Monday, 11:10am-12:30pm Room: Baie des Anges

Chair: Hosein Marzi
St. Francis Xavier University, Antigonish, Canada

Nonlinear neural network for conditional variance forecast

Porntip Dechpichai, Pamela Davy
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The majority of techniques developed for modeling financial time series aim to detect linear structure. Most nonlinear time series models focus either on nonlinearity in mean or nonlinearity in variance, and relatively few models include both types of nonlinearity. Artificial Neural Networks (ANNs) can be used to model nonlinearity in mean or in variance or in both mean and variance. This article will concentrate on ANN modelling of nonlinearity in variance, in order to allow direct comparison with the Generalised Autoregressive Conditional Heteroscedastic (GARCH) model. The main objective of research is to develop a new technique to enable simultaneous modeling of the conditional mean and conditional variance for nonlinear time series. This research has been carried out using the advantages of a nonlinear neural network. Commonly, the objective function, the sum of squared errors in Artificial Neural Networks (ANNs) requires the target and forecasted output vector to have the same dimension. The neural networks with two-dimensional output even though the target data are one-dimensional have been then developing instead using the negative log-likelihood based on a parametric statistical model as a possible alternative to the traditional least squares objective. In addition, the idea of the optimization algorithm can be extended to this situation using the NLMINB optimization function, using PORT routines (The R Project for Statistical Computing) to train the network. The multilayer feed-forward network with Normal density function has been firstly introduced in Dechpichai and Davy (2007) to archive the goal. Thereafter recurrent network has been employed to improve the performance. Feeding back previous variance estimates is analogous to the GARCH approach. However, the results so far have shown the lower bound and upper bound in some cases for conditional variance forecast. Therefore, it would be interests to explore how the new techniques developed works for conditional variance forecast. One of the possible solutions is assuming zero to mean for the new objective function. This process is simular to GARCH model assuming constant mean for volatility estimation. The new techniques with zero-mean will be also compared to the benchmark model, GARCH model through both simulation data and real data.

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Beating the Dow with a Three-Input Neural Network

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In this study we build a series of three-input neural networks (NN's) with the goal of outperforming the Beating-the-Dow (BTD) strategy. In his 1991 book "Beating the Dow", Michael O'Higgins outlines a simple mechanical strategy of picking high dividend yield, low price stocks from the Dow Jones Industrial Average (DJIA). His method selects five stocks from the 30 composing the DJIA, which he argues are poised to outperform the DJIA over the next year. Previously (ISF 2006), we reported on a study in which we used a series of two-input feed-forward NN's to emulate the BTD strategy. Following O'Higgins strategy, the networks were trained using the DJIA stocks with inputs of price and yield. Our methodology used 10-year windows of data (i.e. 1981-90 for the 1991 stock selections), with one-year return as the target output, to train each NN. By using windows of data we hoped successive NN's would have the ability to adapt to changing relationships between the two inputs. Our two-input NN outperformed the DJIA over the time period 1976-2006, but under performed the BTD strategy. In our current work we follow the methodology of the previous research, except that the performance of the stock over the

preceding year is used as an additional (third) input. Some research has suggested that past performance may be used in screens to select stocks that outperform the market. Completed research (April, 2008) will include analysis of years 1976-2007. We will compare the stock-picking ability of a three-input neural network against the Dow Jones Industrial Average, the two-input network, and the Beating-the-Dow strategy. For comparison purposes, we will also consider additional mechanical strategies, similar in flavor to BTD, which incorporate the one-year returns.

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Inputs to Improve the Share Price Forecasts of the Banking Sector

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The issue of stock market modelling and forecasting remains a challenge because of the high volatilities in individual stock prices and the market itself. This topic has received much attention in the literature since forecast errors represent the systematic risk faced by investors. Hence, the ability to reliably forecast the future values of the shares would provide essential help in reducing the risk to those investors through the use of information about the direction of share price variability and historic share prices. While some forecasting models have been successful in forecasting individual financial market datasets, their findings cannot be generalised since the inputs used are often application specific, hence, the success of a model in forecasting one financial time series does not guarantee its success with another. This research is concerned with identifying a set of inputs that are salient to the banking sector and hence can inform and improve the reliability of financial forecasting for the banking sector in the UK. The ordinal market sentiment, a novel technical indicator variable is introduced in this research to be used as an input when modelling the share prices from the banking sector using an adaptive Back-propagation Neural Network, forecasting models were built to forecast the future share prices of HSBC, Lloyds TSB and the Royal Bank of Scotland. Empirical results give sufficient evidence to conclude that using the ordinal market sentiment technical indicator variable as an input generally improves the forecasting models for datasets from the banking sector in terms of the number of turning points predicted and conventional forecast accuracy measures.

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Forecasting Option Pricing Using Neural Networks

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This paper presents a study on option price forecasting. It describes parametric solutions and non-parametric approaches. Then, it compares the forecasting outcomes of each approach. In this study, twenty year data of S&P 500 index call option prices has been used. Initially Black-Sholes formulaic model was used. Next simple Artificial Neural Networks was implemented and used for forecasting future options. The outcome of Simple NN was better than that of Black-Scholes approach. Finally, a hybrid neural network was developed that incorporated Black-Scholes model. The performance of hybrid neural network outperformed the tradition forecasting model and showed improvements to the prediction results of simple neural networks. Forecasting option prices and the ability to predict future market trends are very important for investors in options market and traders. For this reason, a great deal of research has been done in this area to try to find the best predictor to utilize. Past studies have looked at basically two approaches. These are parametric and non-parametric. The most popular conventional parametric approach is the Black-Scholes model. This approach uses financial mathematics in an attempt to predict the option prices. The non-parametric approach is a realitively new approach to option pricing as it has been studied in just a little over a decade. This approach utilizes self-learning artificial intelligence tools as their forecasters. Neural networks are one of the most popular tools used in the area. The purpose of this study is to compare the forecasting abilities of the traditional Black-Scholes model against both a simple neural network and a hybrid neural network which utilizes aspects of the Black-Scholes model into its neural network.

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ENR8

Invited Session: Modelling for energy and weather derivatives

Monday, 11:10am-12:30pm Room: Clipper

Chair: Dominique Guégan
Université Paris1 – Panthéon - Sorbonne, France

Non linear modelling for weather derivatives

Jason M. Hay, Rodney C. Wolff
Queensland University of Technology, Australia

Weather derivatives are financial instruments that are used as part of a risk management strategy to reduce risk associated with adverse or unexpected weather conditions. They have similar structures to other types of financial derivatives except that the underlying weather variable determines the pay-off and, unusually for financial derivatives, this underlying does not have an intrinsic financial value. It is common for a weather derivative contract to use a discretised temperature measurement, i.e., cooling or heating degree day calculated from a temperature measurement from a single weather recording station. If, for example, a farmer in a remote region wished to utilise a weather derivative contract as a risk management tool, then basis risk could result due to the possibly large distance between the farm and the weather recording station. We aim to quantify and reduce basis risk using spatial statistical methods. In particular, we investigate the effectiveness of using a combination of commonly used time series models, together with geostatistical techniques, in order to analyse and model temperature observations from spatially adjacent measuring stations with a view to pricing a weather derivative contract for an arbitrary location interior to the measurement sites. Both local and global geostatistical techniques are applied to the observed average daily temperatures supplied by the Australian Bureau of Meteorology for the period 1 January 1975 to 31 December 2005 (11 323 days) within the latitude – longitude box (137 – 153 0E, 10 – 29 0S) in the state of Queensland, Australia, a region of 1.8 million km2 with 266 temperature recording stations. We present results on how weather volatility can be imputed for a specific location, based on data from a number of nearby sources. We also outline some difficulties in data management and analysis.

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A memory time varying ARFIMA model for weather derivative pricing

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In the last ten years weather derivatives have become popular instruments for the hedging of weather risks. Unfortunately, the specific feature of such instruments do not allow the direct application of the traditional Black & Scholes (BS) pricing approach. Many alternative solutions have been proposed, some based on variations of the BS approach with a sound of theoretical foundation, other derived from actuarial methods, such as Historical Burn Analysis, Index Modelling or Daily Modelling. The practical experience, the method flexibility and the relative accuracy in pricing contracts, evidence that the biggest potential accuracy is given by Daily Modelling. Nowadays practitioners use the ARFIMA-FIGARCH model as the basic tool for weather derivative pricing. However, such approach may lead to over- or underestimation of the contract prices caused by the missing time-varying long memory behaviour observed on weather related variables. In this paper we present a generalisation of the long memory ARFIMA models introducing time-varying memory coefficients. The model satisfies the empirical evidence of changing memory observed in average temperature series and can provide useful improvements in the forecasting, simulation and pricing issues related to weather derivatives. We provide an application related to the forecast and simulation of temperature indices used for pricing of weather options.

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Information Disclosure and Risk Aversion in the European Carbon Market

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This article aims at evaluating the impact of information disclosure on changes in investors preferences in the EU ETS. Since the price collapse that occurred on April, 2006 due to the disclosure of 2005 emissions, investors might be concerned by the emergence of future shocks related to the negotiation of National Allocation Plans for Phase II. Following the methodology developed by Jackwerth (2000), we recover empirically risk aversion adjustments on the period 2006-07 by estimating first the risk-neutral distribution from ECX option prices and second the actual distribution from ECX futures. Our results suggest that this new markets display empirical features of a great interest. We find a dramatic change in the market subjective distribution after the 2006 collapse that has not be assessed yet.

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A k-factor Gegenbauer Asymmetric Power GARCH approach for modelling electricity spot price dynamics

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Electricity spot prices exhibit a number of typical features that are not found in most financial time series, such as complex seasonality patterns, persistence (hyperbolic decay of the autocorrelation function), mean reversion, spikes, asymmetric behavior and leptokurtosis. Efforts have been made worldwide to model the behaviour of the electricity's market price. In this paper, we propose a new approach dealing with the stationary k-factor Gegenbauer process with Asymmetric Power GARCH noise with conditional Student-t distribution, which can take into account the previous features. We derive the stationary and invertible conditions as well as the delta-th-order moment of this model that we called GGk-APGARCH model. Then we focus on the estimation parameters and provide the analytical form of the likelihood which permits to obtain consistent estimates. In order to characterize the properties of these estimates we perform a Monte Carlo experiment. Finally the previous approach is used to model electricity spot prices data coming from the Leipzig Power Exchange (LPX) in Germany, Powernext in France, Operadora del Mercado Espagnol de Electricidad (OMEL) in Spain and the Pennsylvania-New Jersey-Maryland (PJM) interconnection in United States. In terms of forecasting criteria we obtain very good results comparing with models using hederoscedastic asymmetric errors.

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EBC21

Invited Session: Macroeconomic Forecasting

Monday, 11:10am-12:30pm Room: Fregate

Chair: Herman Stekler
George Washington University

Are executives likely to underestimate the risks of recessions when making investment decisions?

Paul Goodwin
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Dilek Önkal
Bilkent University, Turkey

Herman O. Stekler
George Washington University, USA.

It has been suggested that economists' failures to forecast recessions occurs because: i) they have low prior probabilities for economic downturns, ii) they do not revise these prior probabilities upwards sufficiently when leading economic indicators are published (often because these indicators are ambiguous) and iii) the opportunity loss to the forecasters of predicting a recession which does not occur exceeds that of not predicting a recession that does occur. We designed an experiment to test whether these factors are likely to influence executives' willingness to invest in countries where they face losses if a recession occurs. We found that their prior probabilities were well calibrated with the probabilities of recession that were implicitly suggested by the economic scenarios they received. They also over–revised low prior probabilities upwards in the light of economic indicators of a recession (even when the indicator contained no diagnostic information), but demonstrated conservatism when their prior probabilities were high. Overall the results suggest that low prior probabilities and conservatism are unlikely to lead executives to underestimate the risks of recession. Instead, a decision to invest in a country where there was a high risk of recession was more likely to be a result of the asymmetry of opportunity losses associated with the decision than a systematic underestimation of the risk. If economic forecasters behave in the same way as executives then asymmetric losses appear to be the main reason for their failures to anticipate recessions.

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Forecast Accuracy and Other Determinants of Profitability in Interest Rate Futures Trading

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This paper examines the extent to which the profitability of trades in an interest rate futures market depends on (a) the accuracy of forecasts, (b) the amount of capital at risk, (c) the liquidity of the market and (d) the economic policy regime. Forecasts are taken from a large panel of individuals in the years 1982-2006, and we compare simple trading rules with "optimal-f" rules in which position sizes depend on time-varying probabilities of success, and the signal: noise ratio in the underlying futures price series. Contrary to earlier studies (on limited data) we find significant correlations of profits with forecast accuracy across individuals. We also find that these and other academic studies of trading rules understate the value of financial forecasts by assuming simple static trading strategies.
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Too Many cooks? – the German Joint Diagnosis And ITs production

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Ullrich Heilemann
University of Leipzig, Germany

The Joint Diagnosis (Gemeinschaftsdiagnose) [JD], a joint forecast of five (later six) major German research institutes commissioned by the German government is the oldest and most influential German biannual macroeconomic forecast. This paper examines three questions: (i) Do all forecasts of the institutes at the beginning of the production of the JD pass the usual tests, i.e. of unbiasedness and efficiency; (ii) How does the result change if we use asymmetric loss functions or assume dependence between the forecast of different variables? (iii) How are the results regarding the encompassing properties of a simple average compared to the JD. Tests employed include rank tests, tests for bias and forecast performance as well as different forecast encompassing tests as well as tests under asymmetric loss. In addition we look for shifts of the institutes' forecast performance over the last 40 years.

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Multivariate Forecast Evaluation Based on linear policy rules

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This paper introduces a new methodology for quantitative evaluation of policy forecast errors when there is more than one variable which is important for the policy decision. We apply this methodology to the Federal Reserve forecasts of U.S. real output growth and the inflation rate using the Taylor (1993) monetary policy rule. Our results suggest it is possible to calculate policy forecast errors using joint predictions for a number of variables. These policy forecast errors have a direct interpretation for the impact of forecasts on policy. In the case of the Federal Reserve, we find that on average, Fed policy based on the Taylor rule was nearly a full percentage point away from the intended target because of errors in forecasting growth and inflation.

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FIN7

Contributed Session: Finance II

Monday, 11:10am-12:30pm Room: Le Gallion

Chair: Shinichi Tsuda
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Anatomy of a Robust Value-Focused Return Forecasting Model

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Traditional fundamental return forecasts are done in a two-stage framework that loses information, are brittle in terms of extreme sensitivity to small errors in hard-to-forecast variables such as growth rates and discount rates, and are subject to multiplicative errors.This paper presents an alternative to the conventional two-stage framework, namely a composite one-stage return forecasting framework illustrated by a value-focused adaptively re-estimated return forecast. The eight explanatory variables in our adaptively re-estimated composite regression model are four value ratios (earnings yield, cash yield, sales yield, and the book-to-price ratio) and four value relatives for each of these four ratios. There are two major contributions from this paper: 1) Illustrating the art of adaptive robust forecasting by combining together a number of robustness and information extraction methods including outlier trimming, robust regression rather than outlier sensitive OLS, significance-based coefficient adjustments, and short-period re-estimation of explanatory coefficients with smoothing. 2) Formulating a response subsurface optimization framework showing in the context of value-focused return forecasts that this optimization procedure can extract economically and statistically significant portfolio-level forecast value from stock-level return forecasts that have terrible information-to-noise ratios, e.g., often as bad as 1 to 50. The response subsurface optimization: 1) diversifies both noise and uncorrelated estimation errors, 2) controls for the pervasive multicollinearity among most of the systematic return factors, and 3) isolates stock-level forecast information from the generally much greater effect of a large number of systematic return-risk factors that tend to overwhelm stock-level return information in month-to-month return forecasts.

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Estimating the Wishart Affine Stochastic Correlation Model using the Empirical Characteristic Function

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In this paper, we present and discuss the estimation of the Wishart Affine Stochastic Correlation (WASC) model introduced in Da Fonseca et alii (2006) under the historical measure. We review the main estimation possibilities for this continuous time process and provide elements to show that the utilization of empirical characteristic function-based estimates is advisable as this function is exponential affine in the WASC case. We thus propose to use the estimation strategy closed to the ones developed in Chacko et Viceira (2003) and Carrasco et alii (2007). We use a continuum of moment conditions based on the characteristic function obtained when the co-volatility process has been integrated out. We investigate the behavior of the estimates through Monte Carlo simulations. Then, we present the estimation results obtained using a dataset of equity indexes: SP500, FTSE, DAX and CAC. On the basis of these results, we show that the WASC captures many of the known stylized facts associated with financial markets, including the negative correlation between stock returns and volatility. It also helps reveal interesting patterns in the studied indexes' covariances and their correlation dynamics.
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Novel Stories About Forecasting International Stock Market Returns: Structural Breaks, Theory-Induced Restrictions and Cross-Country Linkages

Marco Willner
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We take up the challenge of forecasting out-of-sample the return on stock market indices. This work is motivated by Goyal and Welch (2006) who show that a wide range of popular predictors poorly forecast out-of-sample the US equity premium. We extend their work in three aspects. First, we report results for four mayor stock markets: US, UK, Germany and Japan. Using a common set of predictors and a sample covering January 1970 through December 2005 we find significant differences across countries in the ability of forecasting equity premia. Second, this paper focuses on the choice of models and, to a lesser extent, on the choice of predictors. This reflects the changing focus that can be found in recent years. A large portion of the literature in the 1980s and 1990s proposed new variables that were supposed to forecast equity premiums well. Using univariate linear regressions, Goyal and Welch (2006) give a systematic account of this line of research. Recently several papers discussed the structure of the model rather the choice of variables. In this paper we explore two structural aspect that have attracted attention in the literature: structural changes and theory-induced restrictions. We show that certain structural specifications actually do add forecasting power. Finally, we evaluate the forecasting performance in terms of both the size of the forecasting error and the quality of sign predictions. Goyal and Welch (2006) find poor forecasting performance of various regressions while performance is evaluated in terms of a statistic based upon the forecasting error. However, one of the key findings of the paper is that the results look more favorable for the forecasting models when it comes to forecasting the direction of market movements.

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Short-Term Forecasting of Stock Market

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This study deals with short-term forecasting of stock prices. Stock markets are nowadays most important to treat the worldwide economical activities. The short-term variations of stock markets yield opportunities of capital gain or loss. Most participants in the markets expect to maximize their investment by the capital gain. Especially, the internet trading is making us easily access markets lately with cheaper commission, such as day trading, so that short term performance has been very significant in the practical sense. When we analyze markets, there are quite a few indexes to read the trend and/or change of stock prices for near future. Among those, MACD (Moving Average Convergence/Divergence trading method) is one of the simplest ones and therefore has been widely used to make decisions of the timing for buying or selling. This study mainly aims for improving this conventional MACD, and further we look for a better way of decision making. The MACD actually has drawbacks. One of those is delays which mean the lag of timings of buying and selling by the golden cross and dead cross of two kinds of moving averages. In the MACD the golden crosses appear a bit later than we expect and vice versa for dead crosses. This might lead us to lose or reduce an opportunity for the available gain. A key feature in this study is to modify this MACD by numerical investigations using past stock price data of Japanese market. And as noted above, we try to improve the lateness of this method. Furthermore we proposes a method to combine another index with this modified MACD. The RSI (Relatively Strength Index) was selected for this combination partner. A few simulations were conducted to demonstrate the applicability of this approach. As a result, better performances ware obtained using this combination dealing.

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EBC8

Contributed Session: Dynamic Factor Models

Monday, 11:10am-12:30pm Room: Le Mistral

Chair: Massimiliano Marcellino
IGIER - Bocconi University, Italy

ML estimation of large dynamic factor model with missing data: Forecasting euro area GDP with mixed frequency and short-history indicators

Marta Banbura, Michele Modugno
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In this paper we show how to estimate the approximate dynamic factor model a la Doz, Giannone and Reichlin (2006) for large panels with arbitrary pattern of missing data. This allows us to deal efficiently and in a fairly automatic manner with sets of indicators characterized by different frequencies, sample lengths and publication delays. We apply this methodology to nowcasting and short-term forecasting of the euro area GDP based on a large panel of data. In contrast to most of the studies which typically use only monthly series with very few or no missing observations we can also include quarterly as well as very short monthly indicators. Short sample length is indeed a relevant problem for the euro area as substantial number of series has been compiled only since recently (e.g. services surveys). On the other hand the employment, unit labour cost and hourly labour cost variables are available only at a quarterly frequency. The empirical results show that adding quarterly and 'short' monthly indicators can lead to improvements in forecast accuracy. In particular we find substantial gains when the services surveys are included in the panel. Our methodology can be also directly applied for backdating and interpolation.

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A Dynamic Factor Model for Forecasting Macroeconomic Variables in South Africa

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University of Pretoria, South Africa

This paper uses the Dynamic Factor Model (DFM) framework, which accommodates a large cross-section of macroeconomic time series for forecasting the growth rate of output, inflation, and the nominal short-term interest rate (91-days Treasury Bills rate) for the South African economy. The DFM used in this study contains 267 quarterly series observed over the period 1980Q1-2006Q4. The rational behind the use of DFM is to extract few common factors that that drive all series included in the panel. The model estimated here shows in total five common factors explain the maximum variation of series in South Africa. The results indicate the DFM outperforms the New-Keynesian Dynamic Stochastic General Equilibrium (NKDSGE) in out-of-sample forecasting for output growth inflation, and nominal short-term interest rate. The DFM is best suited for forecasting interest rates, while the VAR for inflation and the BVAR for growth. However, in general, the differences in the forecast of the optimal BVAR for growth and the VAR for inflation are not significantly different from those of the DFM.

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A Monthly Indicator of Economic Activity for Luxembourg

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This paper presents a new indicator of economic activity for Luxembourg, developed using a large database of 99 economic and financial time series. The methodology used corresponds to the generalised dynamic-factor models that has been introduced in the literature by Forni et alii (2005), and the model as been estimated over the period from June 1995 to June 2007. Several means have been used to evalu-ate its forecasting performances and results are satisfactory. They in particular give clear evidence that our indicator allows to obtain better forecasts of the GDP growth relative to a more classical approach that relies on GDP past values only. This indicator is calculated on an experimental basis and changes may be integrated.

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Factor-MIDAS for now- and forecasting with ragged-edge data

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This paper compares different ways to estimate the current state of the economy using factor models that can handle unbalanced datasets. Due to the different release lags of business cycle indicators, data unbalancedness often emerges at the end of multivariate samples, which is sometimes referred to as the `ragged edge' of the data. Using a large monthly dataset of the German economy, we compare the performance of different factor models in the presence of the ragged edge: static and dynamic principal components based on realigned data, the Expectation-Maximisation (EM) algorithm and the Kalman smoother in a state-space model context. The monthly factors are used to estimate current quarter GDP, called the `nowcast', using different versions of what we call factor-based mixed-data sampling (Factor-MIDAS) approaches. We compare all possible combinations of factor estimation methods and Factor-MIDAS projections with respect to nowcast performance. Additionally, we compare the performance of the nowcast factor models with the performance of quarterly factor models based on time-aggregated and thus balanced data, which neglect the most timely observations of business cycle indicators at the end of the sample. Our empirical findings show that the factor estimation methods don't differ much with respect to nowcasting accuracy. Concerning the projections, the most parsimonious MIDAS projection performs best overall. Finally, quarterly models are in general outperformed by the nowcast factor models that can exploit ragged-edge data.

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ICT4

Invited Session: ICT Forecasting

Monday, 11:10am-12:30pm Room: Les Courants

Chair: Mohsen Hamoudia
France Telecom Group, Paris, France and ESDES Business School, Lyon, France

Uncertainty of forecasted new service market capacity obtained by logistic model

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Logistic model of growth is widely used model for technological and market development forecasting because of its many useful properties. In telecommunications, logistic model is used as a quantitative forecasting method for the new service market adoption when interaction with other services can be neglected. Growth forecasting relies on hypothesis that extrapolation of model, which is fitted to known data points, will be valid in the perceivable future. Thus, parameters of the model as well as forecasted values are sensitive to the accuracy of input data points. In general, logistic model parameter determination requires the application of an iterative numerical method, which complicates direct assessment of model sensitivity to uncertainty of input data. Namely, the uncertainty in the determination of telecommunications service market capacity is of great concern to operators. Presented analytical procedure for direct logistic model parameter determination in case of equidistant time points gives valuable basis for the full sensitivity analysis. Expressions and contour graphs showing dependence of forecasted market capacity on uncertainty of input data are obtained by the total differentiation approach. In addition, required conditions and analysis of practical cases with input data uncertainty influence on forecasting results are presented.

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Redesigning the UK broadband network by Monte Carlo simulation

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William Lee
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The UK telephone network is a historical patchwork consisting of over 5000 telephone exchanges that are used to deliver broadband and communication services to the majority of households. This infrastructure is rapidly becoming inadequate for dealing. This is partly due to population growth and migration, but mainly due to demand for bandwidth hungry internet services like high definition television, and video conferencing. One solution that is currently being considered is to upgrade the network to use fibre-optic cables. Fibre optic cables have higher data transmission rates than the copper cables currently used and have lower attenuation. One way to reduce the costs of deploying a fibre optic network is to reduce the number of exchanges used saving the money needed to maintain those exchanges. We attempt to determine mathematically the most profitable way to upgrade the network: optimising the replacement of copper cables and decomissioning of exchanges.

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Preprocessing of Input Data of Neural Networks: The Case of Predicting Telecommunication Network Traffic

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Janis Lelis
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The prediction of network traffic plays an important role in designing, optimization and management of modern telecommunications networks. Network traffic is a non-linear time series generated by a complex dynamic system, and incorporating both stochastic and deterministic components. The mechanism of neural networks is considered to be the most appropriate method for the prediction of future behavior of such complicated processes. At present the information on prior processing of input data is incomplete and inconsistent. However, the presentation of data set and its statistical properties influence the results of forecasting not less than the selection of an appropriate network architecture and method of learning. The aim of our research was to create a functional algorithm of preprocessing of input data taking into account the specific aspects of teletraffic and properties of neural networks. Among the primary stages of the algorithm is the reduction of a time series to stationarity (the estimation and extraction of deterministic trend and seasonal components), the estimation of anomalous outliers, the decorrelation within multiple input variables, increasing the uniformity of the distribution of input data, the reduction of input data to the range of values of the activation function etc. The algorithm was applied to a time series which characterizes outgoing traffic of an IP network during one year. Such neural architectures as a multi-layer perceptron and radial-basis function network were applied. The forecasts were also produced with the same neural architectures without applying preprocessing of input data. The comparison of the results obtained in both cases shows that the procedure of data preprocessing decreases the time of learning (what is particularly important in the case of large data sets) and increases the plausibility and accuracy of the forecasts. The algorithm can be applied, with some restrictions, to other non-stationary time series containing trend and seasonal variations.

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Competition and Diffusion: A case of Wireless Telecommunication

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How does competitive entry or exit affect growth or decline in diffusion of technology? Our review of the literature indicated that existing research is focused on forecasting demand for new and existing technologies. There is limited understanding about nature of competition as well as competitive posture of industry participants. Moreover, existing literature has paid limited attention for category demand versus brand level or selective demand. In this paper, we propose that competition may impact industry evolution either at the category (each competitor gets relative shares) or at brand level. Thus, we argue that in the first case, diffusion occurs uniformly across competitors and diffusion parameters for each competitor are similar. On the other hand, one or more competitors might develop unique niche in the industry and become category leaders. This alternative view would suggest that market diffusion depends upon action and outcome of leader(s). In this presentation, using data from wireless telecommunication companies and trade association, we find better support for leader diffusion pattern.

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MTD2

Contributed Session: Forecasting Methods II

Monday, 11:10am-12:30pm Room: Sirocco

Chair: Jae H. Kim
Monash University, Australia

An Approach for Short Time Series Modeling

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Statistical Research and Training Center, Tehran, Iran

Adel Mohammadpour
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Consider a few number of short time series where collected simultaneously about different characteristics of a phenomena. In this case we cannot fit the traditional time series model for each time series or a multivariate time series such as ARIMA models. Using these short time series as a panel data has been suggested by many researchers as a good proposal for modeling short time series; however, in the case of a small number of short series, panel data may not be an appropriate assumption for them. In this paper we introduce a method for fitting a suitable model for such data sets. In our procedure we transform all of the short series into a single long series and try to fit and predict the short series by using the long series. We apply our proposed method on real data.

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Forecasting methods of non-stationary stochastic processes that use external criteria

Igor V. Kononenko, Anton N. Ryepin
Ukraine

The purpose of this work is to create and study an effective forecasting method of non-stationary stochastic processes in the case when observations in the base period are scarce. To achieve this objective we propose two forecasting methods. The fist one is a forecasting method which uses H-criterion. The gist of this method can be described as follows. The matrix of the input data is divided into the learning and check submatrices in g different ways. The parameters of the tested models are estimated in accordance with the chosen loss-functions on the learning submatrices. Using the selected loss-functions, we calculate the deviations of the models from the forecasted variable on the learning submatrices. The best model is the one for which the sum of loss functions calculated on the learning submatrices is minimal. The second one is a method of forecasting of non-stationary stochastic processes that use a bootstrap evaluation. This method differs in that the selection of the structure takes place at the end points of the original sample and all samples generated by the bootstrap method.We further researched the proposed methods and compared them to the cross-validation. After conducting several empirical studies, we found a set of data partitions on the learning and check submatrices and defined a number of bootstrap-iterations, which provided statistically more accurate forecasts (with a confidence probability of 99 %) than the cross-validation technique. The suggested method were used to the forecasting of sales volume of wheeled tractors in the US and the production volume of tractors in Ukraine and the production volume of bakery in Kharkivska Oblast (Ukraine). We also designed a forecasting method of non-stationary stochastic processes that consists in a combined use of the two methods previously discussed.

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Confidence Intervals for the Long Run Elasticities of Demand for Hong Kong Tourism: a Bootstrap Approach

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This paper estimates confidence intervals for the long run elasticities of tourism demand for Hong Kong. Using quarterly data of nine major source markets (Australia, China, Japan, Korea, Philippines, Singapore, Taiwan, the UK, and the US) from 1985 to 2006, we adopt the bootstrap, a statistical method well-known to provide more accurate confidence intervals for long run elasticities than the conventional methods. For each source market, we test for the existence of long run relationship among the demand, income, and (own and substitute) prices using the bounds tests. We then fit an ARDL model for each market, from which point estimates of long run elasticities are calculated. In addition to the bootstrap suitable for white noise error term, we employ the moving block bootstrap and wild bootstrap, which respectively provide intervals robust to unknown forms of serial correlation and heteroskedasticity in the error term. It is found that tourism demands are highly elastic to income in the long run, with the income elasticities of China, Korea, and UK significantly greater than one. Tight and informative confidence intervals are also obtained for price elasticities. The own price elasticities are found to be negative for Australia, Japan, Korea, and the US; while the substitute price elasticities are positive for Korea, Philippines, and the UK.

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Bias-corrected Bootstrap Prediction Intervals for Autoregressive Model: New Alternatives with Applications to Tourism Forecasting

Jae H. Kim
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Haiyan Song, Kevin F. Wong
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This paper makes three main contributions to the interval forecasting literature. First, in generating prediction intervals based on the bias-corrected bootstrap, we have extended the model structure so that the AR model contains an arbitrary number of deterministic components. In addition to bootstrap bias-correction, we have used the analytic formula derived by Kiviet and Phillips (1994), which was not used in previous studies. Second, we have proposed a new stationarity-correction based on stable spectral factorization, which has better theoretical basis than Kilian's (1998a, 1998b) method exclusively used in past studies. Third, we have evaluated the performance of the bias-corrected bootstrap prediction intervals for the number of tourist arrivals in Hong Kong from a set of selected markets. This kind of empirical assessment has never been done in the tourism forecasting literature. We have conducted an extensive Monte Carlo experiment to evaluate the performance of these new alternatives. We have found that the stationarity-correction based on stable spectral factorization provides more stable and tighter prediction intervals than Kilian's correction. We also found that that both bootstrap bias-corrected prediction intervals based analytic and bootstrap bias-correction show desirable small sample properties. The proposed methods are applied to forecasting international tourist arrivals from Canada, UK and US to Hong Kong. It is found that prediction intervals based on bootstrap bias-correction provides statistically adequate interval forecasts. Those based on analytic bias-correction performed poorly, possibly due to strong non-normality in the data.

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TRA1

Contributed Session: Transportation and Tourism

Monday, 11:10am-12:30pm Room: Azur

Chair: Peg Young
BTS, Washington, USA

A Bayesian graphical dynamic approach to forecasting and monitoring road traffic flow networks

Casper Albers, Catriona Queen
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Congestion is a major problem on many roads worldwide. Many roads now have induction loops implanted into the road surface providing real-time traffic flow data. These data can be used in a traffic management system to monitor current traffic flows in a network so that traffic can be directed and managed efficiently. Reliable short-term forecasting and monitoring models of traffic flows are crucial for the success of any traffic management system. Traffic flow data are invariably multivariate so that the flows of traffic upstream and downstream of a particular data collection site S in the network are very informative about the flows at site S. Despite this, most of the short-term forecasting models of traffic flows are univariate and consider the flow at site S in isolation. In this paper we use a Bayesian graphical dynamic model (GDM) for forecasting traffic flow. A GDM is a multivariate model which uses a graph in which the nodes represent flows at the various data collection sites, and the links between nodes represent the conditional independence and causal structure between flows at different sites. All computation in GDMs is performed locally, so that model computation is always simple, even for arbitrarily complex road networks. This allows the model to work in real-time, as required by any traffic management system. GDMs are also non-stationary and can readily accommodate changes in traffic flows. This is an essential property for any model for use with traffic management systems where series often exhibit temporary changes due to congestion or accidents, for example. Finally, GDMs are often easily interpretable by non-statisticians, making them easy-to-use and understand. The paper will focus on the problem of forecasting and monitoring traffic flows in two separate busy motorway networks in the UK.

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Short-term traffic time forecasting using supervised neural network model with traffic density patterns

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Travel time estimation is a key factor in the successful implementation of routing guidance applications in Intelligent Transportation Systems (ITS).Traditional models of traffic congestion and management lack the adaptability and sophistication needed to effectively and reliably deal with increasing traffic volume on certain road stretches. Many existing models base either on speed or traffic flows for traffic condition forecasting. This article will focus on the analysis and usage of time series of traffic density values due to its capability to unambiguously characterize the quality of traffic operations. Real traffic data provided by loop detectors located at strategic highway sections were employed in order to achieve a more realistic behavior. Statistical sample and partial autocorrelation functions were used to detect self-similarity and measure the degree of association between data in the time series. Classifying and predictive error patterns of traffic density values were set according to the results. A supervised neural network structure based on fuzzy ARTMAP theory is proposed to classify those patterns and provide an estimation of future travel time values in a short-term horizon. Different datasets of real traffic data were selected to validate the proposed architecture and make a comparison with the ARIMA time series forecasting model. Remarkable good results were obtained in terms of MAPE and MAE expressions, overcoming the major handicaps attributable to traditional traffic short-term forecasting methods.
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The probability of death in traffic accidents. How important an early medical response is?

Rocio Sanchez-Mangas, Antonio Garcia-Ferrer, Aranzazu de Juan, Antonio Martin Arroyo
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The number of deaths in road traffic accidents in Spain exceeds three thousand people each year. While the number of accidents or number of victims rates are comparable or even lower than in other European countries, it is remarkable than the fatality rates (defined as the percentage of dead over victims) are much higher in Spain than in some of our neighbour countries. An early medical assistance response seems crucial to reduce fatality rates since 66% of deaths occurs in the first 20 minutes after the accident. In some European countries, legislation sets a minimum time for the emergency services to arrive to the accident scene. This kind of policy does not exist in Spain. In this paper we analyze a sample of more than 1500 traffic accidents occurred in our country in 2004. Our objective is twofold. First, we try to determine the relevant variables to explain the probability of death in a traffic accident. We focus on factors related to the road, to the vehicles and to the personal characteristics of the driver and other persons involved in the accident. Second, we pay special attention to quantify to which extent a reduction in the time it takes to the emergency services to arrive to the accident scene can help to reduce the number of deaths.

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Forecasting Competition on Transportation Data: A Modal Perspective

Peg Young
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The most recent forecasting competition run by Michele Hibon employed 368 transportation-related data sets, which encompassed yearly, quarterly, monthly, daily and hourly series. The preliminary set of results studied the accuracy of the forecasts given by the competitors, based upon the time series characteristics of the data. This presentation takes a new perspective on the forecasting results, by comparing and contrasting the results across the transportation modes, in an attempt to determine if the different modes of transportation forecast differently. Studying the differences in forecast accuracy across modes may also bring about a better understanding of the differences in time series behaviors across modes.

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FS1

Featured Session

Monday 01:45pm-02:40pm Room: Baie des Anges

Chair: Mohsen Hamoudia
France Telecom Group, Paris, France and ESDES Business School, Lyon, France

Theoretically-Motivated Long-Term Forecasting with Limited Data

Gary Madden
Curtin University of Technology,Perth, Australia

This paper forecasts national information and communications technology (ICT) expenditure shares with limited data. The approach allows for network effects (through New Economy transition) based on theoretical microeconomic foundations. In particular, the analysis: develops a model (incorporating network effects and non-homothetic technology); estimates and tests structural demand parameters; and apply the results to provide long-term ICT diffusion forecasts. Importantly, the methods apply to any industry that exhibit externalities and non-homotheticity.

Gary Madden holds a BEc (Hons) from Macquarie University and a PhD in Economics from the University of Tasmania. His primary research area is the economic modelling of electronic networks. Within this gambit his particular research fields encompass theoretically motivated short time-series forecasting, the economics of disruptive technologies, digital divide issues, externalities and Internet evolution, and the welfare impact of economic growth. He is the author of 78 peer-reviewed publications in these fields since 1993 and has attracted over $1m to the University for his research since 1994. In particular, Gary is Chief Investigator on four ARC Discovery Project (Large) grants since 1998. He is a consultant to government and a Member of the Board of Directors of the International Telecommunications Society. Gary is currently Associate Editor of the International Journal of Management and Network Economics, and Editorial Board Member of The Open Communication Science Journal and the Journal of Media Economics. Gary is also a Member of the Scientific Council of Communications and Strategies.

ENR7

Invited Session: Forecasting Electricity Load Demand and Price in a Competitive Market

Monday, 01:40pm-02:40pm Room: Clipper

Chair: Xavier Brossat
Electricité de France, France

Forecasting electricity price spike on the French Powernext market

Stéphanie Muller
Electricité de France, France

David Mercier
CEA, Centre de Saclay, France

Since the creation of the Powernext electricity market in 2001, the French electricity spot price is occasionally subjected to high volatility leading to spikes. This phenomenon is usually related to a tension in the offer/demand equilibrium. On November 20th 2007, a 2 500 €/MWh spikes occurs at 8 PM while the average value at this hour is around 85 € at this period. The anticipation of these strongly non linear phenomena plays an important part for the activities of trading or manage-ment of the short-term production. This article presents a learning-based approach to forecast the occurrence probability of this spikes. First, an automatic and adaptive spike characterization has been proposed. Then, the input data have been selected using both Chisquare criterion and mutual information. A multilayer perceptron neural network has been trained to learn the spike occurrence. In order to increase the performances of the system by optimizing the use of the predictable available data, several models has been developed specialized regarding the season (winter or summer) and the horizon of forecast varying from 1 to 9 days. The results confirm both the different nature of this spikes according to the season – ones occurring the winter being more difficult to anticipate - and the strong impact of some of variables such as the temperature, the level of lakes or the German wind production. For the summer season (from April 1st to September 30th), 82 % of spikes are correctly fore-casted until the 9 days-horizon. regarding the wintry season, 64 % of them are well forecasted on the same horizon. The perspectives of improvement of this study concern the spikes characterization state using expert knowledge instead of an automatic procedure and the evaluation of the use of new learning-based methods maximizing the margin allowing to increase the power of generalization with few individuals.

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On-Line Mixing of Individual Predictors With Tracking Algorithms Based on Exogenous Information

Yannig Goude
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Recently the problem of online learning a sequence of stochastic observations for which we can make a finite number M of predictions with a fixed set of experts has received many attentions. The aim is to combine them in order to achieve, under general assumptions, the predictive performance of an a-priori unknown predictor, classically the best predictor among M. In practice, breaks can occur in the data generating process, entailing that this best predictor can change with time. We introduce new mixing algorithms with time varying weights that can adapt to the breaks. The novelty is to merge machine learning algorithms and on-line statistical detection of breaks that allows the use of exogenous variable in the detection process. We apply these methods to electrical load forecasting problem. More precisely, our goal is to improve the forecasts made in operation by the French electrical company EDF. In this setting, the experts come from the EDF operational model tuned in different ways and the occurrence of breaks is due to local variations of EDF costumers behaviour that can induce local change in the temperature demand relation or seasonal variation of the one day or one week ahead correlations for example. Physically, these changes have many interpretations among them stand social reasons (holidays, special days and events…), economical reasons (customers arrival/departure) and physical reasons (extreme weather conditions). Most of time, we have access on-line to exogenous variables (meteorological variables, calendar events) realizations and predictions. We use it as entries in our break detection methods and show how it can improve the forecast locally.

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Confidence Intervals for Load Forecasting

Xavier Brossat
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Georges Oppenheim
Université d'Orsay, France

In a deregulated context, it is necessary to provide confidence intervals or stochastic forecasts for electricity demand, especially for production optimization. Until now models used in practice only calculate a deterministic forecast. The basic problem is the migration computation from the input trough the model up to the forecast step. In this field, two main directions appear; the deterministic approaches where physics play an important part, the systems being known, and the stochastic approach. This study concerns the stochastic approach, producing several point confidence intervals including estimation intervals and forecasting intervals using G.A.M (General Additive Model, a well suited model to this kind of data). The estimation interval of the function f (the expectation) is based on point limit theorems for the estimators of the components. f_n-hat is constructed on cubic splines. As far as the forecast interval is concerned, the estimator of the noise (eps_i) distribution gives the useful information. Asymptotically, when the sample size tends to infinity, the difference f_n-hat-f tends to zero almost surely. The interval is based on the distribution of the eps_i-hat. For finite n (when n is small) a dependant variable bootstrap computes the interval. The results prove the feasibility for Electricity consumption forecast. The quality is rather good when evaluated by usual criteria (rmse, mape) over a testing year. There remains to improve forecast accuracy during difficult periods as winter holidays, break down periods. Several theoretical issues remain: asymptotic convergence rate of the estimators, noise models whose variance is a time function.

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EBC13

Contributed Session: Macroeconomic Forecasting IV

Monday, 01:40pm-02:40pm Room: Fregate

Chair: Lars-Erik Oller
Stockholm University, Sweden

A temporal aggregation ARIMA system for forecasting and monitoring annual government deficits within the year

Teresa Leal
University of Huelva, Spain

Javier J. Pérez
European Central Bank, Frankfurt am Main, Germany

The aim of this paper is to develop a monthly forecasting and monitoring system for the annual government budget balance based on temporal aggregation ARIMA techniques applied to monthly government data. Given the lack of annual information in the short run the proposed approach might be useful for policymakers as an early warning tool for budgetary slippages. In order to evaluate the predictive ability of our models, we compare their forecast performance with that of monthly ARIMA models and that of government projections. The results confirm the suitability of the proposed model for short-term monitoring and forecasting.

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Structural VAR based estimates of the euro area output gap: Theoretical considerations and empirical evidence

Gian Luigi Mazzi
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James Mitchell
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Users are particularly interested in the output gap either because it is believed to give relevant information on the cyclical behaviour of the economy and/or for its capacity to anticipate future trends in inflation. Despite its relevance, the output gap is probably one of the unobserved economic variables for which estimation is most controversial and uncertain. On one hand, univariate methods are considered too mechanical and criticised as unable to incorporate economic constraints. On the other hand, structural multivariate methods based on production functions require a large amount of information, which is somewhat difficult to gather at high frequencies. Moreover they often produce quite volatile estimates of the output gap, due to their concentration on potential output. Structural VAR (SVAR) models are used widely in business cycle analysis to estimate the output gap because they combine a robust statistical framework with the ability to integrate alternative economic constraints. In this paper we consider several alternative specifications of economic constraints for both co-integrated and non co-integrated SVAR models. In the first part of the paper we give an economic interpretation to the permanent and transitory components generated by alternative long run constraints, making a comparison with the multivariate Beveridge-Nelson (BN) decomposition and Dynamic Stochastic General Equilibrium models. In particular, we briefly discuss the fact that in the long run both SVAR models and the multivariate BN decomposition have a random walk representation for the permanent component while in the short run they could diverge. In the empirical part of the paper we analyse and compare alternative estimates of the output gap for the euro area obtained under different constraint specifications, considering both classical UC models as well as univariate HP filters as benchmarks. We also present a detailed analysis of the real time properties of alternative output gap estimates measuring their reliability in terms of correlation with the "final" estimates based on the full-sample. A perceived advantage of

SVAR models, relative to UC models, is that SVAR models can be viewed as one-sided filters; in this sense they are said to overcome the end-point problem associated with UC models which can be seen to involve application of a two-sided filter. We therefore compare the real-time performance of SVAR estimators with those of traditional UC models. Finally we study the capacity of different output gap estimates to forecast inflationary movements. Generally, we find that multivariate approaches perform better than the univariate HP filter. Amongst the multivariate methods, SVAR estimates deliver neither more informative nor less informative indicators of inflation than the other decompositions methods. Nevertheless, SVAR models with inflation do anticipate inflation better than the benchmark HP filter, providing at least some support for the view that economic theory "helps".

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Macroeconomic forecasts

Lars-Erik Oller
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What is a macroeconomic forecast and why should it interest me? Who makes national accounts (SNA) and forecasts of them, and how? Should I trust them? We look at forecast research during 10 years. Average forecast errors of growth: 1½ to 2 %. Turning points seldom seen in advance, negative growth forecasts rare. Bad SNA data partly to blame. Still, macroeconomic short term forecasts contain information and consensus forecasts are useful.

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FIN6

Contributed Session: Finance I

Monday, 01:40pm-02:40pm Room: Le Gallion

Chair: Nikolay Gospodinov
Concordia University, Montreal, Canada

Forecasting Real State Prices in Spain

Miguel A. Ariño, Franz Heukamp
IESE, Barcelona, Spain

Miguel A. Canela
Barcelona, Spain

The purpose of this communication is to present an ongoing research aimed to forecast prices in the real state market in Spain. Our data come from a commercial website, in which about 200,000 apartments are offered monthly for sale by particular owners at given prices. Some of them have been already advertised the previous months and some of them are new offers. From these ads, a monthly price index for apartments can be built. Based on information such as: The number and price of new apartments advertised every month, the current month variations (increases or decreases) of the prices of apartments that have been previously advertised, the variation of the mean time that an apartment lasts to be sold, forecast about future prices of apartments can be obtained, as well as insights about the future evolution of the real state market.

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A SVM approach to foreign exchange forecasting

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This paper presents a new approach based on Support Vector Machine (SVM) for forecasting the currency exchange rate between the U.S. dollar and the euro. The variables considered to determine exchange rate movements are: the level of inflation, the interest rate differential, the GDP, the level of productivity, the current account balance, the equity flow, and the current fiscal position among others. Out of these variables, the five variables having the greatest influence on the exchange rate were selected for both zones. The data for these variables was collected quarterly from the beginning of 1999, which was the year of the introduction of the euro, until the third quarter of 2007. Different sources of databases were used to collect this information: the U.S. Federal Reserve Board, the Eurostat, the European Central Bank statistical warehouse, and the U.S. Bureau of Economic Analysis, among others. Support Vector Machines (SVM) are a type of learning machine based on the statistical learning theory, which implements the structural risk minimization inductive principle in order to obtain a good generalization from data sets of limited size.There has been a great deal of research interest in these methods over the last years, because they provide good generalization on the data, and they are well suited for sparse data; i.e. a reduced set of data is enough to obtain good estimations. In addition, they exhibit independence of the results from the input space dimension; the number of variables chosen to describe the patterns and is not critical. The results obtained show SVM's forecasting power as a sound alternative to other conventional forecasting tools such as neural networks and ARIMA models in the international finance area.

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A New Look at the Forward Premium Puzzle

Nikolay Gospodinov
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This study is empirically motivated by the forward premium puzzle that is broadly defined as the finding of large negative and highly unstable slope parameter estimates in regressions of future exchange returns on current forward premium. The puzzling behavior of the forward premium regression estimates stands in sharp contrast with the unity parameter predicted by economic theory (unbiasedness hypothesis) and is further reinforced by the empirical support for the unbiasedness hypothesis in the model in levels and the overwhelming rejection of this hypothesis in the differenced specification. Our paper investigates the sampling properties of the slope parameters in levels and differenced forward premium exchange rate regressions by deriving several theoretical results that provide guidance to understanding the anomalous behavior of these estimates. The novelty of the paper is to highlight the interaction of the high persistence with the low variability and endogeneity of the regressor and reconcile some seemingly contradictory results in the forward premium literature. The analysis suggests that the large negative values and highly unstable behavior of the slope estimates in the usual differenced specification, reported in many empirical studies, appear to be due to the simultaneous presence of a number of data characteristics that have not been fully incorporated into the inference procedure and a risk premium. The paper also proposes alternative specifications for estimating the forward premium regression that do not suffer from the aforementioned problems and render much more stable and precise estimates.

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EBC2

Contributed Session: Monetary Policy

Monday, 01:40pm-02:40pm Room: Le Mistral

Chair: Claudio Antonini
MIT, USA

Monetary Policy Instrument and Inflation in South Africa: Application of the Structural Vector Error Correction model

Lumengo Bonga-Bonga, Alain Kabundi
University of Johannesburg, Republic of South Africa

Since the adoption of inflation rate targeting policy, there has been a great concern on the effectiveness of monetary policy to curb inflation in South Africa. The effectiveness of the repo rate as a policy instrument to control the level of inflation has been widely criticised not only in the South African context but also internationally. With the critics pointing out from a substantial lag for monetary policy changes to affect inflation to the inability of the policy instrument to effectively affect inflation level. In assessing the effectiveness of the monetary policy in South Africa, this paper makes use of the structural vector error correction model (SVECM) to characterise the dynamics of inflation to monetary policy shocks. The results of the impulse response function obtained from the SVECM found that positive shocks to monetary policy increase rather than decrease inflation in South Africa.

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Time series univariate models of medium and high frequency monetary indicators: its use for the implementation and review of monetary policy

Elena Judith Ganón-Garayalde
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Since 2002 the Central Bank of Uruguay (BCU) has been applying a control regime of monetary aggregates. The projection of monetary indicators through time series univariate models have become a main input within such framework both, in the planning of monthly targets, and in daily monetary review. In this paper, work day data of BCU's coins and notes supply is analyzed through a statistical and time series viewpoint. From the former analysis, a model is proposed to predict in the current month with base in the second work day which has been used in the daily monitoring of monetary policy. The development of time series univariate models for monetary variables with monthly frequency (currency in circulation, M1, M2, sight deposits, savings deposits and time deposits) are described onwards. And an assessment of the quality of the predictions offered by these models, which are useful as input for structural models and the programming of the monetary multiplier, is also discussed.

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The Effects of Forecasting on Monetary Policies: The Determination of Coupon Rates for GDP-Linked Bonds

Claudio Antonini
MIT, USA

GDP-linked bonds have been proposed to alleviate international financing issues of developing countries and emerging markets, to reduce their probabilities of default, and to promote counter-cyclical fiscal policies. Although the successful implementation of the bond programs should require simplicity of implementation--particularly to improve its acceptability--so far, the pricing of the bonds has encountered a few difficulties, some related to uncertainties on how to model various key aspects of the economic cycle and others due to the novelty of the instruments. The monetary and fiscal policies are typically studied resorting to simulations of the macroeconomic model for the country in question. However, there have been very few comprehensive simulations involving GDP-linked bonds, and none comparing either the coupon prices or the stability of the monetary policy for two of the most common cited types: the Borensztein-Mauro and Shiller bonds. We will show that for all types of exogenous inputs, the latter type of bond generates a greater debt service than the former. Thus, and contrary to the initial objective of improving the fiscal sustainability, Shiller bonds induce a higher default probability than Borenzstein-Mauro's. We will discuss the reasons for this behavior, which are directly related to the stability of the closed-loop system. Ultimately, choosing the right forecasting model will determine the economic health of the country and the investors alike.

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MTD6

Contributed Session: Combined Forecasts

Monday, 01:40pm-02:40pm Room: Les Courants

Chair: Pilar Poncela
Universidad Autónoma de Madrid, Spain

A Nonparametric Bayesian Approach to Forecast Combination

Carlos Maté
Universidad Pontificia Comillas, Madrid, Spain

This paper proposes the use of Bayesian nonparametric methodology -based on the celebrated Dirichlet process (DP)-to combine several independent forecasts of a magnitude. A density forecast, taken from a study with data or from the beliefs of a forecast team, is considered as a prior guess which is accompanied by a measure of the confidence we have in that guess. A set of forecasts on the magnitude enables us to compute the posterior, which is used to obtain the forecast combination and provide point, interval and density forecasts. An application to macroeconomic forecasts illustrates this new methodology and the handling of DPs is simplified by practical guidelines. Some proposals for further research are suggested.

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Combining Tests of Predictive Ability

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Andrea Bentancor
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In this paper we focus on combining out-of-sample test statistics of the Martingale Difference Hypothesis (MDH) to explore whether a new combined statistic may induce a test with higher asymptotic power. Asymptotic normality implies that more power can be achieved by finding the optimal weight in a combined t-ratio. Unfortunately, this optimal weight is degenerated under the null of no predictability. To overcome this problem we introduce a penalization function that attracts the optimal weight to the interior of the feasible combination set. The new optimal weight associated with the penalization problem is well defined under the null, ensuring asymptotic normality of the resulting combined test. We show, via simulations, that our proposed combined test displays important gains in power and good empirical size. In fact, the new test outperforms its single components displaying gains in power up to 45%. Finally, we illustrate our approach with an empirical application aimed at testing predictability of Chilean and Canadian exchange rate returns.

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Forecast Combination through Dimension Reduction Techniques

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Eva Senra
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The combination of individual forecasts is often a useful tool to improve forecast accuracy. This paper considers several methods to produce a single forecast from several individual forecasts. We compare "standard" but hard to beat combination schemes (like the average at each period of time or consensus forecast and OLS-based combinations schemes) to more sophisticated alternatives that involve dimension reduction techniques. First, we will compare it to dimension reduction techniques that do not take into account the previous values of the variable of interest y (the one we want to forecast) as principal components and dynamic factor models, but only the forecasts being made (the X's). Secondly, we compare it to dimension reduction techniques that take into account not only the forecasts made by the experts (the X's), but also the previous values of the variable being forecast y, as Partial Least Squares and Sliced Inverse Regression. We will use the Survey of Professional Forecasters as the source of forecasts. Therefore, we do not know how the forecasts were made. The survey provides forecasts for the main US macroeconomic aggregates. We have obtained that both PLS and PC regression are good alternatives to the average of forecasts, while factor models are always outperformed by one of the previous two alternatives considered. We have also obtained that as regards the uncorrelated information among forecasters, it is not useful for to improve forecast accuracy, at least, in terms of reduction of the RMSE. Only the correlated information among forecasters is valuable.

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EXS1

Contributed Session: Exponential Smoothing I

Monday, 01:40pm-02:40pm Room: Sirocco

Chair: Bernard J. Morzuch
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Bayesian analysis of a multivariate Holt-Winters model

Ana Corberán-Vallet, José D. Bermúdez, Enriqueta Vercher
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The main objective of this work is to obtain accurate forecasts of time series with correlated errors at each time point using a Bayesian forecast approach based on the multivariate Holt-Winters model. The use of a multivariate model allows us to accommodate the interrelationship between the series and improve fit and forecast accuracy. Our formulation for the multivariate model assumes that each of the univariate time series comes from the univariate Holt-Winters model and that there is contemporaneous correlation between corresponding errors in the univariate models. Using the formulation for the univariate Holt-Winters model as a linear model, the multivariate Holt-Winters model can be formulated as a seemingly unrelated regression model. This formulation allows us to obtain the posterior distribution of the model parameters (initial conditions, smoothing parameters and covariance matrix). The design matrices are unknown as they depend on the smoothing parameters. This complicates the analysis of the model. The posterior distribution of the unknowns is not analytically tractable, but a sample from this distribution can be obtained using a Metropolis-within-Gibbs algorithm. Using this sample we can also estimate the posterior density for the correlation coefficients and check the contemporaneous correlation between the errors assumed by the model. Finally, the predictive distribution is approached using Monte Carlo integration, as well as their main moments and percentiles, which allow us to obtain point forecasts and prediction intervals. We present the results obtained in the prediction of hotel occupancy time series of three provinces of Spain, where the tourism has become an important source of income. The series, available in the web page of the Spanish National Institute of Statistics, show regular growth and additive seasonality. Moreover, it is reasonable to assume that the three province data series are correlated.

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Boot-EXPOS: a mix procedure

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Manuela Neves
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In this paper the bootstrap methodology for dependent data is used. Exponential smoothing methods are considered to model time series, instead of the traditional ARIMA class. The idea is to join these two approaches (bootstrap and exponential smoothing) and to construct a computational algorithm to obtain forecasts.

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A comparison of forecast accuracy for Holt-Winters-type methods based on various model structures in the context of high-frequency data with double seasonal pattern

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Previous authors have shown the one-to-one correspondence between the standard Holt-Winters algorithm or method and a model with level, trend and additive seasonal factors and a constant single source of error. Different assumptions about the error structure, for example, that it varies with season, can be accommodated by modifications to the standard H-W method. An econometric parallel is the relation between the classical linear model and the ordinary least squares method of parameter estimation. Where different assumptions are made about the disturbances, for example, that they are first-order autocorrelated, then suitable transformations of OLS maintain the correspondence. We work with hourly data. In the Holt-Winters context, when suitable restrictions on the weekly cycle are imposed, a number of interesting special cases emerge, where daily cycles of various forms occur within the weekly cycle. These are examples of double seasonality. Commercially available H-W software is unable to handle either the large number of seasonal factors or the various restrictions. We examine the consequences of specifying models with different error structures, including single and multiple sources of error, to forecast two different series. The series of hourly arrivals at a hospital emergency room contains zero entries and is therefore restricted to additive seasonality. The series of hourly electricity loads can be modeled with both additive and multiplicative seasonality. o clear picture emerges as to whether multiple or single source of error is the preferred model, nor which case of double seasonality is most applicable. Differences in post-sample forecast accuracies are small and within-sample accuracy is a reasonable though not perfect guide to model choice.

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NN3

Contributed Session: Theory and Applications of Neural Networks

Monday, 01:40pm-02:40pm Room: Azur

Chair: Hans Georg Zimmermann
Siemens AG, Munich, Germany

Industrial prognostic - An evolving approach to limit the prediction error

Mohamed El-Koujok, Rafael Gouriveau, Noureddine Zerhouni
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Industrial prognostic is nowadays recognized as a key feature in maintenance strategies as it should allow avoiding inopportune maintenance spending. Real prognostic systems are however scarce in industry and the general purpose of the work is to propose a prognostic system able to approximate and predict the degradation of an equipment, the final objective being the quantification of the remaining useful life of the industrial plant. The efficiency of a prognostic system is highly dependent on its ability to perform "good" predictions as reliability indicators follow from it. That said, in practice, choosing an efficient technique to support this forecasting activity depends on classical industrial constraints that limit the applicability of the tools: available knowledge, evolution of the equipment (linearity, periodicity…), requirements of the prediction tool (precision, flexibility, complexity, computation time…). According to it, adaptive networks are valorised. More precisely, the work deals with the development of an evolving neuro-fuzzy predictor based on the "Evolving Takagi-Sugeno" (ETS) system developed by Angelov. ETS learning is used to be performed in two phases: a first one to online optimize the architecture of ETS by using a clustering algorithm and a second one to optimize the consequence parameters of the inference system. ETS learning algorithm is modified in order to explicitly take into account an error limit for predictions. In this way, the online structure learning algorithm is improved by considering the error prediction as a novel indicator to cluster the input space. The inside objective of this proposition is to ensure that predictions will be into an acceptable confidence limit defined by the user, i.e., to look forward a compromise between generalization and approximation. From the applicative point of view, developments are led with the objective of being integrated to an e-maintenance platform at a French industrial partner (em@systec).

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A Hybrid Linear Dynamic System - Neural Network Model for Analysis and Forecasting of Time Series

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The role of linear dynamic system models in analysis and forecasting of time series, whether bearing white noise or colored noise, is well known. These, well established models, are widely used in studying many real life, simple to complex, phenomena, in a parsimonious manner and yielding optimum results. On the other hand, use of neural network models is also picking up momentum due to their remarkable self learning and training capabilities. Both of these types of models, naturally, are not holy at all. Like all man made systems, these can't be declared flawless. They have their own, pros and cons. Keeping in mind evens and odds of both of these models a hybrid linear dynamic system- neural network model is presented for analysis and forecasting of time series and their practical implications discussed. The parameters of this new breed of models are optimally estimated using recursive equations. These equations also provide on line variance learning facility for unknown variances. To generate forecasts from near to far flung future a forecast generator is introduced. This hybrid linear dynamic system-neural network model is expected to yield better results than the individual parent models.

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Time Series Forecasting with Neural Networks

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Many times one is amazed by the way and speed the human brain solves certain problems. Noting this, the original Neural Networks method attempted to solve the problems by simulating the workings of the human brain - however, with the important difference that the human brain first analyzed the problem while the Neural Networks did not. The data for the forecasting competition NN5 are first analyzed by an ordinary human brain. For each of the 111 series, we divide the data into years calculating seasonal factors for 'the day of the week', 'week of the year' and 'overall trend' either manually because the series are of short duration, OR with one of the Seasonal Adjustment Programs and MIGHT also treat the factors as 'additive' instead of 'multiplicative'. We ignore zeros and missing values from the above calculations but decide individually, if it is a missing or genuine value. Using above factors, we obtain smoothed series from the raw time series. Any discontinuities in the series are adjusted by 'splicing' the old series to the new series. I.e., the old series is brought to the level of the new series. The average daily differences between the raw and the adjusted values over the two years are recorded and saved as adjustments to the forecasts from the smoothed data. The smoothed data are reverted back to time series and we plan to run Neural Networks on the smoothed series by taking x latest daily figures as test data and the remaining earlier data as 'training data' with x=1, 2, 3, …, 40. the minimum root mean square error is used to select an 'x' value as the 'best' Neural Network model for the series. This model is used to calculate the required forecasts. The process is repeated for the remaining time series.

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NLM1

Contributed Session: Non-Linear Models I

Monday, 02:50pm-04:10pm Room: Baie des Anges

Chair: Yuzhi Cai
University of Plymouth, UK

Selecting Non-linear Forecasting Models

Jennifer Castle, David Hendry
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A method of automatic model selection is developed when there is nonlinearity inherent in the process. The strategy uses a new test for nonlinearity, specifies the general model using a range of non-linear approximations if linearity is rejected, and undertakes a general-to-specific reduction. The first few terms of many 'basis functions' are found to be preferable to a higher order expansion of one basis function, ensuring the general model approximates a wide range of nonlinear models. Parsimony is obtained through the reduction process and encompassing tests are used to test against preferred specific non-linear functional forms, solving any identification problems. Nonlinear modelling poses a number of problems, including collinearity generated by nonlinear transformations, extreme observations leading to non-normal (fat-tailed) distributions, and often more variables than observations from general expansions approximating the non-linearity, yet one must avoid excess retention of irrelevant variables. Solutions to all of these problems are proposed. The performance of the algorithm is assessed in a forecasting context.

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Evaluating the effects of the first difference transformation on band-TAR processes

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The aim of this paper is to analyse the effects of differencing time series variables featuring a particular nonlinear behaviour which can be described by a band threshold autoregressive model. This kind of behaviour arises when fixed costs of adjustment prevent economic agents from adjusting until the deviation from equilibrium exceeds a critical threshold. Many economic variables are characterised by this type of adjustment process (inventories, money balances, prices and even efficient financial markets variables). The band-TAR model represents a dynamic system which consists of two different regimes, an inner one whose observations follow a random walk and an outer regime whose observations obey a stationary autoregressive process; therefore, the process shows a mean reverting kind of behaviour. Pippinger and Goering (1993) document the poor power properties of the standard Dickey-Fuller tests when applied to such nonlinear series, however Enders and Granger (1998) show that if the adjustment is symmetric there is no better alternative than apply the standard Dickey Fuller test. If band-TAR behaviour is overlooked, in empirical applications the series are often differenced given the power loss of the standard ADF tests. In this paper I investigate, by means of a simulation study, the effects of such a transformation on nonlinear time series generated according to a band-TAR model. The main conclusion of this study is that the first difference transformation leads to a decrease of the extent at which the nonlinearity features are present in the original data; this, in turn, has important consequences from a forecasting perspective; forecasts for the levels of the series obtained by integrating the ones produced by linear models fitted to the differenced series turn out to be much less accurate in terms of MSFE than the forecasts calculated from the original band-TAR model.

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Forecasting For Quantile SETAR Time Series Models

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Self-exciting threshold autoregressive (SETAR) time series models have been used extensively in many areas due to the very nice properties of such models. It is well know that SETAR model can be used to predict the levels of a time series. In this paper we consider predicting the quantiles of a time series based on the so called quantile SETAR (QSETAR) time series models. Predicting quantiles of a time series is as important as predicting levels of a time series. Furthermore, predictive quantiles enable us to describe the whole distribution of the future values. In this paper, a new forecasting method for QSETAR models is proposed. Simulation studies and application to real time series show that the method works very well both theoretically and practically.

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ENR2

Contributed Session: Neural Networks for Energy

Monday, 02:50pm-04:10pm Room: Clipper

Chair: Wenjuan Zhang
University of Warwick, UK

An evaluation of Bayesian techniques for controlling model complexity in a neural network for short-term load forecasting

Henrique Hippert, James W. Taylor
Oxford, UK

Artificial neural networks have frequently been proposed for electricity load forecasting because of their capabilities for the nonlinear modelling of large multivariate data sets. However, there are still no widely accepted strategies for designing the models and for implementing them, which makes the process of modelling by neural networks largely heuristic, dependent on the experience of the user. This paper evaluates techniques for automatic neural network modelling within a Bayesian framework, as applied to a dataset containing daily load and weather data for England and Wales. We analyse input selection as carried out by the Bayesian "automatic relevance determination", and in so doing evaluate the benefit of including three different weather variables in the model for load. We also evaluate the usefulness of the Bayesian "evidence" for the selection of the best structure (in terms of number of neurons), as compared to methods based on the correlation of the hidden layer outputs, and on cross-validation. Finally, we evaluate the impact of error in weather forecasts on the accuracy of a weather-based load forecasting model.

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A New Short Term Load Forecasting Using Neuro Fuzzy Model Author

Mohammad Kazeminejad, Sadegh Soleimanpour
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This paper presents a Neuro-fuzzy based short term load forecasting (STLF) method for Iran national power system (INPS) and its regions. We used a special type of Neuro-Fuzzy network that creates the structure of the network based on the inputs. So finding the architecture of network simplified. We used and tested this method for STLF, results shows that it can be used instead of common neural networks and has their capability, but for better result needs to combined by fuzzy expert systems, because it can't deal with suddenly weather changes or uncommon holidays.This method creates a four layers network that the first two layers fuzzify the input, third layer combines rules and the last layer is for defuzzification. In training phase, a rule will be added to network only if the output of the network for this training input was not well.The short term load forecasting simulator developed so far presents satisfactory and better results for one hour up to a week prediction of INPS loads and region of INPS.

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Electric energy prices forecasting on power exchange with the application of artificial neural networks

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Polish power distribution utilities may make use of different forms of energy trade. They can make transactions in contract, balance and market segment and via different ways of electronic trade forms. Well designed market offer demands the knowledge of forecasts of future energy demand and price. Currently, Polish power distribution utilities are equipped with the computer software facilitating forecasting of energy demand, unfortunately they do not have effective tools of electric energy price forecasting. The article presents two forecasting models based on artificial neural networks, with the help of which, it is possible to set forecasts, one day in advance before the exact energy supply and energy price for each hour of trade day and night. Models' fit to real data has been evaluated. As the input data for the first model past energy prices, energy volume, weather related variables, such as temperature, cloudiness, wind speed have been selected together with weather forecasts for the following day and variables describing the day and an hour of transaction All the variables have been measured for each hour of trade day and night. While the second model's construction, variables representing a weather forecast have not been taken into account. In the next part of the article the model's fit to the empirical data has been tested. The best adjusted model served for the electric energy price setting.

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The use of Neural Networks in load forecasting on UK national grid data

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Electricity is traded on a half hourly basis in England and Wales, supply market customers below 100kw Maximum Demand is settled using load profiles. A load profile gives the Half Hourly (Settlement Period) pattern or 'shape' of usage across a day (Settlement Day), and the pattern across the Settlement year, for the average customer of each of the eight profile classes. For the supplier, imbalance costs will incur in the case of shortage and surplus, losses through purchasing at a system buy price which is higher than the wholesale price, or selling at system sell price lower than the wholesale price. To counter the possible erosion of their profit margins, the companies have to minimize their costs by forecasting the demand, especially the load profiles using customers' meter reading, weather variables and other covariates. The industry has created the load profiles with fifteen basic regression types, which seems far too complicated. Due to the complex nature of the problem, neural network seems a good candidate to solve the mystery. The advantages of using neural network lays in its ability of solving complex system without the need of modelling the exact relationship, also it can handle large number of inputs and outputs, and which are exactly what we need here. Based on some preliminary analysis results, we are able to implement a single hidden layer feed-forward neural network modeling approach. A simple method using additive 'block' models is used to identify the important factors which affect usage; the analysis of variance allows different models to be tested and interactions to be explored. And we have identified seven important input variables, including season, day type, bank holiday, net (noon effective temperature), sunset, sunset squared, and cloud cover. Since the inputs are rescaled to range about [0,1], so the unit in input layer becomes eleven, five seasons (winter, spring, summer, high summer, and autumn) need four inputs, three day types (weekday, Saturday, Sunday) need two inputs. Cross validation has been used to help us in model selection, for example: units in the hidden layer, weight decay, and input variables. The National Grid data has been used to test the models.

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NPM1

Contributed Session: Non-Parametric Methods I

Monday, 02:50pm-04:10pm Room: Fregate

Chair: Jan De Gooijer
University of Amsterdam, The Netherlands

Multistep Forecasting Non-Stationary Time Series Using Wavelets and Kernel Smoothing

Mina Aminghafari
Amirkabir University of Technology, Tehran, Iran

Jean-Michel Poggi
Université Paris-Sud, Orsay, France.

This work deals with forecasting time series using wavelets and kernel smoothing. Recent approaches involve wavelet decompositions in order to handle non-stationary time series. A forecasting procedure can be performed by estimating the prediction equation by direct regression of the process on the non-decimated wavelet coefficients depending on its past values. In the same context, after the seminal work of Renaud et al. (2003), we study a generalization of the prediction procedure proposed associating kernel smoothing and wavelets. We then illustrate the proposed procedure on non-stationary simulated and real data.

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A Nonparametric Prewhitening Approach to Predict Multivariate Quantiles

Deniz Baglan
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It is well known that a nonparametric conditional quantile estimator of time series regression and hence the forecasts lead to have a bias problem in small or moderately large samples. In this paper, we explore a two-step conditional quantile estimation of predictions which have substantially lower bias compared to the usual nonparametric conditional quantile estimator. The two-step conditional quantile estimation has been proposed in a multivariate setting. We apply the two-step estimation method to predict the tail conditional quantiles of monthly foreign exchange returns. Our results indicate that substantial gains in the tail quantile prediction accuracy are obtained with respect to various loss functions over alternative multivariate and univariate quantile predictors. We also provide extensive Monte Carlo simulations illustrating the superior performance of the two-step nonparametric method over the others in different settings.

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Variable selection by pseudo wavelets in heteroscedastic regression models involving lagged time series variables

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We consider a variable selection procedure using pseudo wavelets for heteroscedastic regression involving lagged explanatory variables. It is often encountered in practice, especially in economic investigations, that a response variable depends on the lags of one or more time series variables. Our motivation arises from analyzing the "J-curve" effect in economics whereas domestic currency devaluation will first induce further trade balance deterioration before improving. It is required is to model the trade balance of a nation after currency devaluation. Such a model should be expected to include, in addition to other economic and financial quantities, the current exchange rate and its lagged values as explanatory variables. Owing to unknown model heteroscedasticity it is desirable to derive an effective procedure to select the correct lags in the model. We have shown that, under general conditions, the pseudo empirical wavelet coefficients corresponding to included lags in the regression are clearly larger than those of excluded ones. In view of this, we have developed a procedure using pseudo wavelets to identify the lags of a time series predictor variable to be included in the regression, and to estimate their associated regression coefficients. All estimators are shown to be consistent. Simulation results have demonstrated that our proposed procedure outperforms the stepwise method in the presence of heteroscedastic errors.

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Parametric and Nonparametric Granger Causality Testing: Linkages Between International Stock Markets

Jan De Gooijer
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This study investigates long-term linear and nonlinear causal linkages among eleven stock markets, six industrialized markets and five emerging markets of South-East Asia. We cover the period 1987-2006, taking into account the on-set of the Asian financial crisis of 1997. We first apply a test for the presence of general nonlinearity in vector time series. Substantial differences exist between the pre- and post-crisis period in terms of the total number of significant nonlinear relationships. We then examine both periods, using a new nonparametric test for Granger non-causality and the conventional parametric Granger non-causality test. One major finding is that the Asian stock markets have become more internationally integrated after the Asian financial crisis. An exception is the Sri Lankan market with almost no significant long-term linear and nonlinear causal linkages with other markets. To ensure that any causality is strictly nonlinear in nature, we also examine the nonlinear causal relationships of VAR filtered residuals and VAR filtered squared residuals for the post-crisis sample. We find quite a few remaining significant bi- and uni-directional causal nonlinear relationships in these series. Finally, after filtering the VAR-residuals with GARCH-BEKK models, we show that the nonparametric test statistics are substantially smaller in both magnitude and statistical significance than those before filtering. This indicates that nonlinear causality can, to a large part, be explained by simple volatility effects.

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FIN10

Invited Session: Applied Portfolio Construction and Management

Monday, 02:50pm-04:10pm Room: Le Gallion

Chair: John Guerard
McKinley, Anchorage, USA

Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory

James Vander Weide
Duke University, USA

Portfolio theory is concerned with developing general principles and practical models for making sound lifetime portfolio decisions. Much of the current research on portfolio theory emanates from the path-breaking mean variance portfolio model of Nobel Laureate Harry Markowitz. Although the mean variance model continues to be the most widely used portfolio model in financial practice, economists have devoted considerable effort to research on two additional models of portfolio behavior, the geometric mean model and the expected utility model. These models offer significant additional insights into optimal portfolio behavior. The purpose of this paper is to review the major findings of the research literature on the mean variance model, the geometric mean model, and the expected utility model. From this review, I develop a set of practical guidelines for making lifetime portfolio decisions.

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Earnings forecasting research

Michael Thompson
Thomson Financial, New York, USA

This presentation surveys earnings forecasting research and examines the opportunity of new implementation strategies in the financial marketplace.

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Empirical Evidence of Significant Performance Benefits from Value-Focused Return Forecasts

Mustafa Gultekin
Kenan-Flagler School of Business, USA

Bernell Stone
School of Management, Brigham Young University, USA

John Guerard
McKinley Capital Mgt., Inc., Anchorage, USA

Anomaly research finds a significant CAPM corrected return dependency for both the price-earnings ratio and the book-to-market ratio. There is now widespread use of the book-to-market ratio as a risk variable in the Fama-French three-factor risk model. In each of the 456 months of our thirty-eight year study period (January 1967 through December 2004), we rank-order stocks on the basis of return forecast score, predicted return normalized to the interval (0,1) to ensure cross-time comparability in the dependent variable when pooling and/or averaging time series of cross sections. We form 30 fractile portfolios at the start of each of the 456 months in the study period and then observe the dependency of realized return on return forecast score. In order to isolate return forecast performance from other return impacting effects including especially systematic risk (beta, size, and book-to-market ratio), tax effects, growth, and other possible non-forecast return impact variables, we use a mathematical assignment program to reassign stock among the 30 portfolios so each portfolio in the cross section has the same sample-average value of each of these return controls while optimally preserving a trade-of between return range in the cross section and within-portfolio return forecast homogeneity. cross section can be assessed. For the overall study period of 1967-2004, we find that the average of 456 monthly cross sections has a significant return dependency (p value greater than .005) even after removing the any contribution from both the book- market ratio and the earnings-price ratio. The control-matched portfolio-level standard deviations are non-monotonic. We obtain Sharpe ratios for the upper quintile of our ranked, control-matched portfolios that are .05 better than the CRSP equal-weighted and value-weighted indices. We reject the null hypothesis of no performance merits for active value-focused after correcting for systematic risks, taxes, growth and possible return impact variables.

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Applying Markowitz's critical line algorithm

Andras Niedermayer
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This paper derives an enhanced version of Markowitz's Critical Line Algorithm for computing the efficient frontier with arbitrary lower and upper bounds on weights. For 2000 assets this algorithm needs a second to compute the whole frontier whereas the quickest competing software package needs several hours. This paper can be considered as a didactic alternative to the Critical Line Algorithm such as presented by Markowitz, with an explicit treatment of all steps and performance benchmarks.

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EBC12

Contributed Session: Macroeconomic Forecasting III

Monday, 02:50pm-04:10pm Room: Le Mistral

Chair: Vincent Labhard
European Central Bank, Frankfurt, Germany

Forecasting of the GDP of German Länder: A dynamic panel data approach

Konstantin A. Kholodilin, Boriss Siliverstovs, Stefan Kooths
DIW Berlin, Germany

In this paper, we make multi-step forecasts of the annual growth rates of the real GDP for each of the 16 German Länder simultaneously. We apply dynamic panel models accounting for spatial dependence between regional GDP. We find that both pooling and accounting for spatial effects helps substantially improve the forecast performance. We demonstrate that effect of accounting for spatial dependence is more pronounced at longer forecasting horizons (the forecast accuracy gain is about 9% at 1-year horizon and exceeds 40% at 5-year horizon). We recommend incorporating spatial dependence structure into regional forecasting models, especially, when long-term forecasts are made.

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Output Gap Estimation in Real Time with Factor Models of Large Cross Section

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Knut Are Aastveit
University of Oslo and Central Bank of Norway, Oslo, Norway

By using a dynamic factor model we attempt to improve the reliability of real time output gap estimation through two mechanisms: First, as the factor model extracts a common component in the data and disregards an idiosyncratic component, data revisions will have less impact to the extent that these revisions are due to new idiosyncratic information or measurement errors. The standard deviation of the difference between a real time estimate and an ex post benchmark (based on final data) is more than halved by using the factor model rather than the standard approach. The result is robust across the different estimation methods for the gap. Second, through the factor model we are able to handle a ragged edge in the data and incorporate new information on non-synchronized variables as they become available. Thus, the end-of-sample problem in the output gap estimation is reduced through the favorable nowcasting properties of the model. We use a panel of 55 real time variables for the US economy of which 15 are subsequently revised (The Federal Reserve of Philadelphia).

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Freedom of Choice in Macroeconomic Forecasting: An Illustration with German Industrial Production and Linear Models

Klaus Wohlrabe, Nikolay Robinzonov
Ifo Institute for Economic Research, Munich, Germany

Different studies provide surprisingly large variety of controversial conclusions about the forecasting power of an indicator, even when it is supposed to forecast the same time series. Therefore, with the current study we aim to provide a thorough overview of linear forecasting techniques and coming up with conclusions, useful for the identification of the predictive relationship between leading indicators and time series. In a case study for Germany we forecast four possible representations of industrial production (monthly and yearly growth rates both calculated the exact and the approximate way). We employ the two workhorses in applied macroeconomic forecasting, the VAR and ARX model. Within these model classes we consider a large variety of time-varying specifications: ex post vs. ex ante, rolling vs. recursive and model specifications such as: restricted vs. unrestricted, AIC vs. BIC vs. OSC, and direct vs. indirect. In a horse race with nine leading indicators plus an AR benchmark we demonstrate the variance of assessment across target variables and forecasting settings (50 per horizon). We present the results in four steps. First we outline some general conclusions about the forecast competition. Then we tabulate the winners for each forecasting setting for different horizons. In order illustrate assessment variance we draw ranking boxplots over the 50 forecasting settings. Finally, in addition to the ordinal ranking we provide statistical evidence whether one indicator provides significantly lower RMSEs than a competitor within a specific setting. We show that it is nearly always possible to find situations, in which one indicator proved to have better predicting power compared to another. Furthermore we find little evidence that the assessment of an indicator varies between exact and approximate calculated growth rates. Eventually, we provide some cautionary notes about how to assess the forecast performance of an indicator.

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Short-term forecasts of GDP growth for the six largest euro area countries

Vincent Labhard, Gerhard Rünstler, Elena Angelini, Fabrice Orlandi
European Central Bank, Frankfurt, Germany

This work reports the results from a forecast evaluation of a dynamic factor model (DFM) for the forecasting of short-term GDP growth in the six largest euro area countries and the euro area. The forecast evaluation exercise is based on a pseudo real-time design, i.e. it accounts for the timing of data releases and uses recursive parameter estimates. One of the key findings from this evaluation exercise is that the performance of the DFM can be enhanced by appropriately selecting the variables from which to extract the common factors. Another key finding relates to the comparison between aggregating forecasts and forecasting on aggregate variables - the evidence suggests that in the case of the DFM, aggregating forecasts across the euro area countries might provide an accurate guide on the outlook for the euro area aggregate.

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ICT5

Invited Session: Network Effects and Critical Mass

Monday, 02:50pm-04:10pm Room: Les Courants

Chair: Gary Madden
Curtin University of Technology, Australia

VoIP in Developing Countries: The Next disruptive Technology?

Aniruddha Banerjee
Analysis Group, Inc., Boston, USA

Paul Rappoport
Temple University & CENTRIS, USA

James Alleman
University of Colorado & Columbia University, USA

Gary Madden
Curtin University of Technology, Australia

A well known disruptive (communications) technology is the Grameen mobile phone. It has contributed jobs and added hundreds of millions of dollars to the gross domestic product in Bangladesh. It has changed the face of communications in the country due to its innovations in financing and distribution methods. Another technology may also prove to be similarly disruptive – web based voice over internet protocol (VoIP) aimed at un-served and under-served customer segments in developing countries (DC). Several firms have targeted these segments that are overcharged, if served at all, by their traditional telecommunication provider. These firms (for simplicity we will term these companies DC-VoIP providers or Providers) are providing inexpensive international telephone calls to this market segment. The DC-VoIP providers are aimed at emerging market small businesses and at enabling social entrepreneurship in developing countries by connecting communities with affordable communications services via internet based technology platforms. These entrepreneurs are analogous to the Bangladeshi phone ladies. The Providers are using the internet to out-flank the incumbent telephone companies, providing more ubiquity in access to telephone service in addition to low cost for the service. The unique feature of some of the Providers' offer is no need for credit cards or checking accounts. Literally, billions of people do not own credit cards, checking accounts or Pay Pal accounts. Moreover, banking services are difficult to access and expensive or completely unavailable for these customer segments. (Service such as Skype or Jajah requires credit cards to use.) The thesis of this paper is that the DC-VoIP providers will prove to be as disruptive and socially beneficial as the Grameen mobile phone. By estimating the demand for the DC-VoIP providers' service, the impact on the economy can be determined. The demand for DC-VoIP providers' service is estimated based on the growth in demand in selected countries. This cross-country data is normalized by country parameters to determine the effect these service will have on specific countries. These estimates are, by analogy with the Grameen's impact, used to calculate the macro consequences of this disruptive technology. Preliminary estimates suggest that the Providers may add an additional one-third of one percent to the economy, a significant amount for the size of the investment.

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Testing for Country-Specific Heterogeneity and Network Effects in Mobile Diffusion

Melisande Cardona, Tobias Kretschmer
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Cellular telephony has diffused in an s-shape in most countries. A number of theoretical mechanisms could generate this pattern, including word-of-mouth, consumer heterogeneity and network effects. One possible way to disentangle these different mechanisms is to study usage intensity over the diffusion curve as these mechanisms generate different predictions about usage intensity over time. Using quarterly operator-level panel data from 42 countries over 6 years and regressing average usage on the current installed bases of the operator in question and competing operators as well as a number of control variables, Grajek and Kretschmer (2006) show that across all countries and operators, consumer heterogeneity plays an important role in the diffusion of mobile telephony and that network effects are less important in comparison. Our paper uses an updated dataset and goes further than Grajek and Kretschmer (2006) by estimating coefficients for different groups of countries to identify region, or country-specific strengths of network effects and degrees of consumer heterogeneity. This enables us to improve on current forecasting methods which base their results on global diffusion parameters rather than country-specific information on consumer heterogeneity and network effects.

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Communications in Next Generation Networks

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This paper, recognizing that communications is a derived demand, we look at the demand for telecommunications services and then overlay these forecasts on the existing information and communications technology (ICT) infrastructure. Future communication networks will be radically different from those existing today. They will be broadband platforms on which applications will provide services to consumers and businesses. Approaching the NGN from the demand side does not eliminate these issues, but, provides clearer insight how to address many of these issues. We focus on the consumers rather than the technologies. What consumers demand is for communications: one-way, two-way, symmetrical or asymmetrical. The communications may be fixed, mobile, interactive, or unidirectional. With the technology and the move to IP protocol, these features can be handled in a few devices and networks – maybe only one. The full integration and convergence of the networks is only beginning to emerge. The paper describes and briefly characterizes the demand for information and communications technology (ICT) services, which we treat as a derived demand. We then provide a backdrop for assessing the forecast of market trends, and their implications for the regulator. Finally, the paper addresses some of the policy issues to place them in the context. The paper shows the relevant demand elasticities are nearly unitary and the last kilometer has significant scale and scope economies, as well as non-trivial sunk costs. Each of these factors alone implies that the market structure will be monopolist or an oligopoly at best. But amplified in combination, Thus the need for clear, certain regulation of this segment of the ICT sector is an absolute necessity. Markets dynamics must be considered based on the demand side and supply side considerations. Demand elasticities must be understood and scale, scope, and sunk cost must be factored into the consideration of the policy alternatives.

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TEC1

Contributed Session: Technology Forecasting

Monday, 02:50pm-04:10pm Room: Sirocco

Chair: Christos J. Emmanouilides
Aristotle University of Thessaloniki, Greece

Forecasting Penetration of a Product under Diminishing Promotional Effects

Sam Weerahandi
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Bass Diffusion Model provides a framework for long-term forecasting of new products and services in a finite consumer population, as always the case. However, the original Bass model does not allow incorporation of promotions in the model. On the other hand Marketing Mix models allow the quantification of promotional effects using a set of cross sectional data. Such estimated effects are valid only for the period of calibration and have diminishing effects over time due to diminishing number of people who can be influenced by promotions. Therefore, in this paper we propose an approach to extend the Bass model so that diminishing effects of promotional variables can be incorporated in a systematic manner. The proposed solution is applied to a pharmaceutical brand to illustrate how forecasting can be carried out under alternative promotional plans.

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Using Media as a Source for Technology Forecasting

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This paper explores the possible uses of media in technology forecasting and foresight using bibliometrical methods. Technology foresight offers ample possibilities for managers to identify and take advantage of opportunities. The identification of opportunities requires observation and monitoring which is said to be the most essential ingredient in technology forecasting. Traditionally technology forecasting literature and tech mining have focused on the early phases of the technologies' life cycle studied mostly from scientific publications and patents. Media, however, can uncover a more comprehensive picture with socio-economic factors involved in the analysis. Media, especially new digital media sources, offer many opportunities in technology forecasting. Watts and Porter (1997) determined the indicators for different technological innovation process concepts that they believe bibliometric measures can obtain. They identified technology life cycle indicators that pointed media to indicate applications and societal impacts of a technology. Media have also been said to be a potential source when finding information about contextual influences and market prospects of a technology (Porter & Cunningham, 2005). This study explores how and to what purposes previous studies in technology forecasting have exploited the possibilities of printed media sources. In addition, some technology forecasting related topics are raised as having the most potential to be extracted bibliometrically from media sources. These topics are discussed in terms of validity and reliability and further tested on the case technology of Bluetooth. The results present possibilities how media could be used as a source for technology forecasting and what kind of information could be best extorted from these sources. Also, these theoretically based possibilities are assessed based on reliability and validity criteria. The problematics relating to media sources being limited in scope and coverage, due to the media's inherent selectiveness of topics, is also discussed.

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A Structured Analogies Approach for Predicting the Demand of New Products

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Companies spend a great amount of resources in developing new products. Predicting their demand is a critical part of the planning process. It is also one of the most challenging tasks for forecasters. By definition, sales data history does not exist for new products. Traditional time series methods of forecasting do not apply, and the usefulness of new product diffusion models is limited when little or no data are available. In such a case, the forecasting task is often delegated to one or more experts who base their judgment on the performance of past similar products. We propose a flexible structured judgmental procedure composed of four main steps, whereby the expert's judgment is aided by statistical tools made available by a computer system. At each step, the expert can interact with the system and modify the suggestions provided by the statistical analysis. In the query step, candidate analogous products are identified among existing products by selecting attributes that match the new products. In the filtering step, the candidate products are further refined into a set of surrogate products by clustering similar series according to a similarity measure. In the modeling step, several statistical models are fitted to the surrogate products data. Finally, in the forecasting step, forecasts are generated from the fitted model, and adjusted by the expert to account for factors not considered by the models. As sales data for the new product become available, they can be incorporated into the process to monitor the performance and further refine the forecasts.

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Predictors of diffusion models' forecasting performance and diffusion model selection

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The paper investigates a number of factors that affect the accuracy of long-term forecasts generated by innovation diffusion models at relatively early stages of diffusion. To make progress in the model selection problem, this paper provides answers to the following research questions: (a) Is the early part of a diffusion series informative about the expected long-range predictive performance of diffusion models? Which variables, measured prior to the generation of the forecasts using only the observed series, are related to forecast accuracy? (b) Are there empirical generalizations that can be made about the effects of these variables on forecasting performance and their relative importance? (c) Can the analyst use these variables to derive statistically valid predictions of diffusion models' long-range forecast accuracy? (d) Are these predictions useful for choosing among alternative diffusion models for a given short diffusion series? The analysis employs simulated series based on 496 real new product diffusion datasets, together with a collection of diffusion models with good forecasting performance. The forecast error is modeled as function of early diffusion summary data, structural characteristics of the diffusion models, and estimation performance measures. Measurement of these factors uses only the observed data and thus is available to the analyst prior to the generation of the forecasts. The method generates valid conditional predictions of the expected forecast accuracy from a diffusion model and explains about 50% of the variation in long-range forecast error. The paper illustrates the benefits of the approach to new product forecasting by introducing a pair-wise diffusion model selection procedure. With correct model selection rates reaching up to 87.6%, the procedure clearly outperforms the unconditional prior probability selection rule that achieves rates up to 51.6%.

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MTD3

Contributed Session: Forecasting Methods III

Monday, 02:50pm-04:10pm Room: Azur

Chair: Marc Wildi
Ipsach, Switzerland

An Evaluation of ARIMA, Dynamic Linear Models and Artificial Neural Networks using the M3 Forecasting Competition Data

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Kathleen Karlon
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Edward L. Boone
Virginia Commonwealth University, USA

This paper is focused on assessing the performance of two time-series forecasting paradigms: Dynamic Linear Models (DLM) and Artificial Neural Networks (ANNs). This research extends the M-3 forecasting competition, a large scale project to assess the efficacy of various forecasting methods. This work provides insight into the performance of the DLM and the Back Propagation ANN against the model architecture. Symmetric Mean Absolute Percentage Error and Mixed Linear Models were used to analyze the competition results, which showed that paradigm performance is dependent upon the class of time-series. Further, the ANN produced better forecast accuracy than all of the models evaluated in this work and the M-3 competition against monthly time-series, which contradicts conclusions reached in the original M-3 competition; specifically, the conclusion of parsimony.

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On measuring forecast accuracy and improving the forecasting process - a case study

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Forecast accuracy measures and the forecasting process are rarely considered jointly. Whereas an appropriate measure of forecast accuracy is a crucial step for the evaluation of forecast quality, until now the discussion on accuracy measures has focused on the mathematical qualities of the formula used. Little attention has been paid to the underlying process to be evaluated. We compared the forecast accuracy measures in place in the case company with the ones proposed in literature and sought measures in line with the underlying process. Our conclusion is that a scale-independent percentage-based measure like the weighted mean absolute percentage error should be used when sales volume is forecast, whereas a scale-dependent measure like the Mean Absolute Error should be used for values, which can be relatively close to zero as it is often the case for percentages. With these findings, managers can check whether the forecast measures in place in their company correspond to the underlying process and adapt them if necessary. After this analysis, different time series forecasting techniques have been compared to support management in forecasting. Two exponential smoothing techniques showed to be apt and much more precise than judgmental forecasts from management. Yet the trust in those techniques was a major concern from management, hindering it's rapid implementation. But several other more process-oriented improvement proposals were implemented.

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Customized forecasting criteria

Marc Wildi
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The winner of the NN3-forecasting competition (complete data-set) is based on a highly modified state-space approach whose estimation criterion has been `customized' in order to match the competition's framework. These modifications include some well-known topics such as: out-of-sample performances, combination of multi-step ahead criteria, robustification or data-driven adaptivity. Additionally, we used a new `self-healing' estimation structure which `degenerates' to traditional maximum likelihood criteria if the model is correctly specified.

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EBC11

Contributed Session: Prices

Monday, 04:30pm-05:30pm Room: Baie des Anges

Chair: Robert M. Kunst
University of Vienna, Austria

Are weekly inflation forecasts informative?

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Are weekly inflation forecasts informative? Although several central banks review and discuss monetary policy issues on a bi-weekly basis, there have been few attempts by analysts to construct systematic estimates of core inflation that supports such a decision-making schedule. The timeliness of news releases and macroeconomic revisions are recognized to be an important information source in real-time estimation. We incorporate real-time information from macroeconomic releases and revisions into our weekly updates of monthly Swiss core inflation using a common factor procedure. The weekly estimates for Swiss core inflation find that it is worthwhile to update the forecast at least twice a month.

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Can exchange rates forecast commodity prices ?

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YuChin Chen
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Kenneth Rogoff
Harvard University

This paper demonstrates that "commodity currency" exchange rates have remarkably robust power in predicting future global commodity prices, both in-sample and out-of-sample. A critical element of our in-sample approach is to allow for structural breaks, endemic to empirical exchange rate models, by implementing the approach of Rossi (2005b). Aside from its practical implications, our forecasting results provide perhaps the most convincing evidence to date that the exchange rate depends on the present value of identifiable exogenous fundamentals. We also find that the reverse relationship holds; that is, that commodity prices Granger-cause exchange rates. However, consistent with the vast post-Meese-Rogoff (1983a,b) literature on forecasting exchange rates, we find that the reverse forecasting regression does not survive out-of-sample testing. We argue, however, that it is quite plausible that exchange rates will be better predictors of exogenous commodity prices than vice-versa, because the exchange rate is fundamentally forward looking. Therefore, following Campbell and Shiller (1987) and Engel and West (2005), the exchange rate is likely to embody important information about future commodity price movements well beyond what econometricians can capture with simple time series models. In contrast, prices for most commodities are extremely sensitive to small shocks to current demand and supply, and are therefore likely to be less forward looking.

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Optimizing forecasts for inflation and interest rates by time-series model averaging

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Inspired by concepts of economic theory, such as the Fisher hypothesis and the theory of the term structure, we consider a small set of simple bivariate closed-loop time-series models for the prediction of price inflation and of long- and short-term interest rates. The set of time-series structures includes vector autoregressions (VAR) in levels and in differences, a cointegrated VAR, and a non-linear VAR with threshold cointegration based on data from Germany, Japan, UK, and the U.S. Following a traditional comparative evaluation of predictive accuracy, we subject all four basic structures to a cross validation using parametric bootstrapping. Ultimately, we utilize the recently developed technique of Mallows model averaging to explore the potential of improving upon the predictions through combinations of the basic models. In particular, we focus on the weights attached to each of the basic models that may provide an interesting alternative to problematic significance tests on forecasting accuracy.

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ENR1

Contributed Session: Electricity Prices

Monday, 04:30pm-05:30pm Room: Clipper

Chair: Antonio Muñoz San Roque
Universidad Pontificia Comillas de Madrid, Spain

On Univariate Time Series Forecasting of Electricity Prices and Similar Data

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Nikolay Nikolaev
University of London, UK

Dealing with unusual observations and outliers is an ongoing research issue in developing forecasting models for energy markets. Electricity prices are known to have some "spikes". Electricity demand series are contaminated by holidays and special events, which are often separately addressed and smoothed out during the modelling process. Ideally, we would like to develop robust forecasting models that can cope with outliers, without the requirement of exogenous interventions.This paper addresses this challenge by reviewing the state of the literature and comparing the performance of a range of univariate models. More specifically, it focuses on nonlinear alternatives and investigates sequential approaches to the Relevance Vector Machine for univariate time series forecasting. Preliminary results on forecasting average daily electricity prices are reported, which indicate the potential of "variational" methods to handle outliers. Nevertheless, our results also confirm that, during non-spiky periods, seasonality prevails and standard time series models that capture the seasonal pattern well may outperform more sophisticated approaches.

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Unobserved component models for forecasting electricity prices and their volatilities

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Julio Rodríguez
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Nowadays, in competitive markets, there are two ways to trade with electricity: bilateral contracts and the pool. As far as bilateral contracts are concerned, what is interesting is to reduce the risk that they imply. This can be done by forecasting electricity prices with a horizon that covers, at least, the length of the contract, usually one year, which means long-term forecasting. The other scenario to trade with electricity is the pool, in which both the generating companies and the consumers submit to the market operator their respective generation and consumption bids for each hour of the forthcoming day. Having short-term accurate forecasts helps the producers schedule the production of their units for profit maximization. Besides, electricity prices present the special feature of having structure both in mean and variance. In this work the Seasonal Dynamic Factor Analysis proposed by Alonso et al. (2007) is applied and extended. We allow unobserved common factors to have ARCH disturbances, considering that ARCH effects can be handled in state-space formulation, where the conditional heteroscedasticity may be present in either the measurement or transition equation errors, as proposed in Harvey, Ruiz and Sentana (1992). The new model developed is applied to forecasting electricity prices and their volatilities.

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Forecasting electricity prices with periodic dynamic regression models

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In this paper, a periodic dynamic regression model is used to carry out a one day-ahead forecast of the Spanish electricity hourly prices. The explanatory variables included in the model are the electricity demand and the wind power generation forecasts supplied by the System Operator. The periodic model switches among different dynamic regression inner models, each one of them specialised in a particular day of the week. This feature makes it possible to cope with the differences that can be observed in the daily seasonal dynamics and in the sensitivity of the price to explanatory variables in working and non-working days. The model has been implemented in a state-space form, using the Kalman filter for the optimal estimation of the state variables of the process. The proposed model is empirically compared to different reference models in order to quantify the improvements due to the inclusion of each of the explanatory variables and the benefits of considering a periodic model. The main outcomes of this work are (a) the wind power generation has been revealed as a very important input variable, that is, its inclusion in the model together with the demand significantly improves the out-of-sample error, and (b) different linear dynamics have been identified in the hourly electricity price time series.

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EBC17

Invited Session: Flash Estimates

Monday, 04:30pm-05:30pm Room: Fregate

Chair: Gian-Luigi Mazzi
Eurostat, European Commission, Luxembourg

Flash Estimation of Certain PEEIs: First Results of a Eurostat-Funded Project

Fabio Bacchini,
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D. Ladiray
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In 2006 Eurostat launched a call for proposals to develop methods and tools in order to produce flash estimates of 3 short-term economic indicators, at EU-27 and Eurozone level: the monthly Industrial Production Index (IPI), the first GDP estimate of the Quarterly National Accounts and the quarterly Labour Cost Index (LCI). For the first two variables, the Flash estimates is required at t + 30 days from the reference period; for the LCI the target is t+45 days. A proposal by four NSIs (France, as coordinator, Germany, Italy and United Kingdom) has been accepted by Eurostat. These NSIs are working in close cooperation to meet the challenge. The project started in January 2007 and will end in September 2008. This paper illustrates the preliminary results of the project. Presentation has been organized in four main parts according to the deliverables of the project. First of all we illustrate the result of the survey that the Consortium realized among the members of the Eurostat "Euroindicators Working Group". The second part refers to the build up of the bibliography on Flash estimation and on its maintainance. The editing and updating of a bibliography implies the definitions of a technical framework that makes it possible to edit, import and export entries. The third block describes the review of the methodology available for flash estimation. Finally, in the last part are presented the first results obtained for IPI and LCI. In particular, quite good results could be obtained for LCI using closely related but not harmonized variables such as conventional earnings and for IPI using business tendency surveys.

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Flash Estimates of European Aggregates

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The early releases of the euro area and European Union quarterly GDP growth and of the Monetary Union Index of Consumer Prices (MUICP) are successful examples of flash estimates of key short-term European indicators. Both indicators have been developed in the framework of the Principal European Economic Indicators (PEEIs) approach, aiming to provide euro-area key short-term indicators according to well defined targets, notably in terms of timeliness. The monthly MUICP and the quarterly GDP flash estimates, released respectively at 0 and 45 days after the end of the reference period, successfully met these targets. The methodology for the compilation of these flash estimates, the continuous monitoring of their quality, the coordination with the releases of the corresponding indicators at national level, a continuously enhanced policy for improvement, the coordinated actions towards the harmonisation at European level and a well targeted communication policy are the key factors that contributed to the performances and the credibility of these indicators. This paper, beyond reporting the technical assumptions and features of the compilation of the flash estimates of these indicators, explores the above mentioned related aspects underlining the relevance of the co-ordination process at European level. With reference to the compilation of the flash estimate of quarterly GDP, it highlights also the impact of major recent methodological changes in national accounts, notably the introduction of chain-linking volume measures, and their technical consequences on the estimation process. The analysis is complemented by a study on the performances of the flash estimates with reference to their ability to catch the movements of the first regular results and, on a longer horizon, on the overall performances in terms of revisions. Finally, the paper sketches the main lines of future developments in these areas, having in mind the challenges of flash estimates in relation to an evolving economy and renewed users requirements.
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An assessment of factor based economic indicators: A comparison of factor and regression based preliminary estimates of Euro-area GDP growth

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This paper considers the timely production of Euro-area GDP estimates. We consider producing estimates not just of Euro-area GDP as an aggregate but disaggregate estimates based on aggregating national nowcasts. Simulated out-of-sample experiments are used to compare the performance of so-called `regression' based estimates, similar to the preliminary estimates published by EUROSTAT, with factor-based estimates. While the regression based estimates exploit available information on selected indicator variables such as industrial production, the factor-based estimates use information on over 150 indicator variables. Both static (Stock-Watson) and dynamic (Forni-Hallin-Lippi-Reichlin) factor approaches are examined. Results indicate that regression-based estimates that use only industrial production as an indicator are, in general, more accurate than factor-based estimates. Our results therefore remind us that more data do not always help. More restricted
models, when the restrictions are well motivated, can and do help.

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MTD5

Contributed Session: Forecasting Systems

Monday, 04:30pm-05:30pm Room: Le Gallion

Chair: Spyros Makridakis
INSEAD, France

ThetaAI: blending the theta model with Artificial Intelligence heuristics

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This paper presents a new extension for the Theta model, a univariate forecasting method originated in 1999, based on the concept of modifying the local curvature of the time-series through a coefficient "Theta". The resulting series, the "Theta-lines" maintain the mean and the slope of the original data but not their curvatures. Their primary qualitative characteristic is the improvement of the approximation of the long-term behavior of the data or the augmentation of the short-term features, depending on the value of the Theta coefficient. The proposed method decomposes the original time series into two or more different Theta-lines. These are extrapolated separately usually with Exponential Smoothing methods and the subsequent forecasts are combined with equal or optimal weights. This paper presents the results of the use of Artificial Intelligence (AI) in: a) Extrapolation, b) Selection, and c) Weighting of the theta lines. The new approach, hereafter called ThetaAI is tested in the NN3 dataset and results are quite promising leading future research towards blending of the Theta model with AI approaches; however the computational intensity of the approach is not to be ignored.

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Segmenting sales forecasting accuracy - an ABC-XYZ-analysis on the accuracy of Neural Networks, SAP APO-DP and Judgmental Forecasting at Beiersdorf

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Sven Crone
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Demand panning in the consumer goods industries faces the challenge of forecasting a large number of heterogeneous products of different sales volumes, levels of randomness, time series length, patterns and varying causal impacts such as promotions. While the amount of products necessitates automatic forecasting, not all products are equally suited to be forecasted automatically and may require different forecasting methods. In order to identify homogeneous subgroups of the assortment for automatic forecasting, we extend conventional ABC-segmentation on the relative importance of a product by XYZ-segmentation on forecasting complexity. The two-dimensional ABC-XYZ-approach segments the assortment into 9 subgroups (AX, BX ..., CZ) and is applied to the assortment of Beiersdorf UK, an international skin and beauty care manufacturer. The aims of the analysis were to (a) identify homogeneous segments within the assortment, and (b) to benchmark the empirical accuracy of different forecasting methods for each category of the assortment, including Neural Networks, SAP APO-DP, and judgmental predictions of a human demand planner using S&OP in comparison to established statistical benchmarks. The analysis provides recommendations on what forecasting method to apply within each product segment. The results indicate, that (1) judgmental S&OP predicts 'Z'-products well that were hard to forecast because of exogenous promotions and short time series, (2) judgmental forecasting fails to increase forecasting accuracy on simple 'X'-products regardless of the randomness or time series pattern, and (3) Neural Networks cannot outperform other forecasting methods on average across the whole assortment, but were equal best to judgmental forecasting on 'Z'-products. The results of the study show that segmenting assortments and applying specific forecasting methods per product-segment is highly reasonable and can increase accuracy and automation across the assortment, in addition to providing more accurate guidelines for setting key performance indicators and allowing a refined performance analysis of human planners.

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PYTHIA: An Expert Forecasting Support System

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Pythia is an expert Forecasting Support System that incorporates most of the forecasting principles as stated in Prof Armstrong's seminar work. In particular, apart from an efficient forecasting engine based on competitions among various established extrapolation techniques, special attention is given in the treatment of special events; identification, rationalization and adjustment of special events are conducted via intelligent heuristics while special actions follow the adjustment of those special periods. Furthermore, causal forecasting and organizational issues are in the forefront of the software; bottom-up versus top-down approaches are utilized once aggregate data are available. Finally, advance monitoring routines guarantee that the slightest deviation of human or system performance will be tracked and dealt with immediate effect.

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MKG2

Contributed Session: Marketing II

Monday, 04:30pm-05:30pm Room: Les Courants

Chair: Andrey Davydenko
Lancaster University Management School, UK

How do firms choose the best hierarchy level at which to forecast? A case study of four high technology firms

Joseph Ogrodowczyk
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Firms make a choice regarding the product-customer levels at which to produce forecasts based on a variety of factors. These include management support, time and labor constraints, accuracy goals and software availability. Given this situation, how do firms decide at what level or levels to forecast? Is there a business process that guides their decision? While much of the previous literature proposes new techniques and methods of forecasting, a number of articles focus on the business process of forecasting (Moon, IJF, 2003), (Fildes and Goodwin, Foresight, 2007). However, very few articles consider the specific factors which influence the choice of forecasting levels or if firms followed a broadly defined business process for choosing these levels. This study consists of in-depth interviews with two semiconductor firms and two electronic manufacturing firms. Our first objective is to gather data on the extent to which the various factors influence a firm's decision process. The second objective is to outline a general process for choosing forecasting levels. The results of the study may indicate that there is a need for non-hierarchical forecasting in the high technology industry.

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Forecasting Customer's Loyalty by Means of an Unsupervised Fuzzy Learning Method

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Albert Samà Monsonís
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The use of unsupervised fuzzy learning classifications techniques allows defining innovative classifications to be applied to forecast customers' behavior in retail marketing. Actually, segmenting the clients' portfolio is important for decision-making in marketing because it allows discovering hidden profiles which would not be detected with other methods. Different strategies can be established for each defined segment. The objective of this paper is to show the utility of the unsupervised learning techniques applied in marketing segmentation. In particular, the LAMDA algorithm (Learning Algorithm for Multivariate Data Analysis) is used. LAMDA is a hybrid connective-based classification method that combines some of the most interesting capabilities of both purely numeric and purely symbolic algorithms. In order to do so, it employs the interpolation capabilities of logic operators over fuzzy environments. The algorithm and a set of criteria that permit dynamically select a fuzzy segmentation are being analyzed and implemented over a new Java-based version of the LAMDA algorithm. In this work the concept of adequacy is considered by associating to each one of the patterns a vector of values between 0 and 1. Each one of its components can be considered a degree of membership to each one of the considered segments (classes). The adequacy will describe how well a customer fits in a given segment. The obtained results permit forecasting the degree of adequacy of each customer to each one of the segments given. The unsupervised capability of the LAMDA algorithm along with the analysis tools developed over the system are being applied in the field of marketing segmentation in order to forecast the customer's loyalty of a supermarket chain in Spanish market.

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Models for Product Demand Forecasting with the Use of Judgmental Adjustments to Statistical Forecasts

Andrey Davydenko, Robert Fildes
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Current experience of using demand forecasting software reveals that purely extrapolative algorithms often become inefficient in practice due to the lack of relevant historical data and their inability to sufficiently handle forthcoming events. One of the widely adopted means for overcoming this imperfection is to use judgmentally provided adjustments to statistically generated forecasts and therefore take into consideration additional information about the environment. However, recent studies show that judgmentally adjusted forecasts themselves contain substantial degree of bias and inefficiencies. This presentation focuses on possible models that could reduce method-specific errors and improve the quality of the final forecasts by combining the original statistical and corresponding judgmentally adjusted demand forecasts. Special modelling techniques are proposed in order to take into consideration the features of available data peculiar to demand forecasting practical settings. In particular, we address the limited number of observations per product, which in some cases renders well-known forecasting combining techniques inapplicable, the evolving time dependent nature of parameters, and ways of classifying adjustments with different statistical properties. The suggested approaches are mainly based on applying dynamic linear models with a hierarchical structure of parameters. Based on real datasets, an assessment is made of the gains that can be achieved by using various combining procedures.

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MTD4

Contributed Session: Big Data Sets

Monday, 04:30pm-05:30pm Room: Sirocco

Chair: Chen-Yu Li
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Comparison of Principal Component Analysis and Independent Component Analysis for financial time series data

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Antonio Garcia-Ferrer
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In this paper we analyze the performance of Principal Component Analysis (PCA) and Independent Component Analysis (ICA). ICA, which looks for statistically independent and non-gaussian latent factors, can be seen as a generalization of PCA. Two different ICA approaches are used to estimate the independent components. The first approach estimates the independent factors by minimizing some measure of non-gaussianity, defined by higher-order statistics, and the second one exploits the temporal structure of the data. We apply both techniques to build the underlying common factors of a multivariate vector of financial time series. Then, we compare the forecast accuracy of the two methods. An empirical application to the Madrid stock market will be presented.

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Comparisons of the robustness of Peña-Box model and factor model: How to extract useful predictors for forecasting inflation of the Four Asian Tigers?

Chen-Yu Li, Yu-Pin Hu
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In order to forecast the industrial production (IP) with the information from a large dataset of monthly macroeconomic time series, one may adopt dimension reduction techniques to extract useful predictors from these macroeconomic variables. This paper compares two approaches to extract the predictors, the Peña-Box model (PBM) and the principal components analysis (PCA), in terms of their robustness to wrong models. Results show that the PBM outperforms the PCA method in theory, simulations, and empirical analysis. In theory, we can show that on the one hand the predictors generated by PBM is robustness to the factor model because the PBM is designed for generating time-effect factors. On the other hand, the performances of PCA is expectantly poor for the PBM because it can capture the contemporary relationships only. Simulations confirm these arguments in terms of out-of-sample forecasting at different time horizons. In empirical analysis of Four Asian Tigers, the PBM is better than the PCA in forecasting their IP, and both methods outperform the AR benchmark model.

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CLI1

Contributed Session: Climate and Environment I

Monday, 04:30pm-05:30pm Room: Azur

Chair: Amitava Konar
Bidhan Chandra Krishi Viswavidyalaya, India

Predicting Suspended Solids in a Wastewater Treatment Plant by means Neural Networks

Narcis Clara
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For multiple practical and theoretical reasons the prediction of the water quality at the effluent of a wastewater treatment plant is a complex task. The set of data used was obtained by simulation with the activated sludge system. The IAWQ's Activated Sludge Model 1models the biological process happened in the biochemical reactors and the double-exponential settling velocity function is chosen as a fair representation of the settling process units to clarify the treated wastewater. The simulated database is formed by records chosen each 15 minutes during two weeks and divided in train, test and validation subsets. Inputs: time, readily biodegradable substrate, heterotrophic biomass, slowly biodegradable substrate, non-biodegradable particulate organic matter, nitrogen, non-biodegradable soluble organic matter, soluble biodegradable organic nitrogen, particulate biodegradable organic nitrogen, inflow rate, aeration energy, pumping energy, and sludge purge. Output: suspended solids. Two known learning techniques have been implemented: a classical adaptative gradient which uses back-propagated gradient information to guide an iterative line search algorithm and a Kalman filter which is used to obtain the best estimate of the weights based on the stream of training data. To try to improve performance and generalization we have implemented two methodologies of variable selection. In one hand, in Genetic Algorithms a set of inputs variables derives its fitness from how successful a model can be built based on just those variables. On the other hand, the implemented fuzzy variable selection intends to assess the flatness of a fuzzy curve because if the output variable is scarcely influenced by the input variable therefore the related fuzzy curve is nearly flat. Results show that Neural Networks are a powerful tool for predicting suspended solids even with great turbulences that is a heavy period of rain where errors do not attaint five percent.

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A neural network based model for rain fed wheat yeld forecasting

Hojat Yazdan Panah
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In this research we used ANN to predict yield of rain fed wheat. To do this at first we made the input matrix of model included daily rainfall, maximum ,minimum and mean temperature, Evapotranspiration, sunshine hours, number of rainy days, relative humidity, number of days with thermal and cooling stresses(were extracted by assessing daily temperature and threshold temperature of 30 and 0 degree centigrade for thermal and cooling stresses respectively).All of these input meteorological parameters were extracted for all studied meteorological stations and was defined as Input vector in ANN model.The meteorological data was obtained during the different phenological stages of wheat all of them reported by 10 Meteorological stations and by one agricultural meteorological station.The output matrix included wheat yielding reports provided from ministiry of agriculture data bank during the 1999-2005 period. According to the output analysis of the model it can be shown that the most important climatic factor determining wheat yield is the amount of rainfall because omitting this factor from the input matrix, the amount of the models RMSE will increase .The accuracy of model was obtained by d index which is about 77%.

Towards modeling aphid population in potato

Amitava Konar, P. K. Sahu
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In a country like India, agriculture continues to play major role in strengthening its economy. Still more than 22% of its GDP is contributed by this sector. Pests and diseases not only cause havoc loss but also threaten food security; more than 30 per cent loss in agriculture produce is due to losses through pests. Worldwide losses due to aphids, a polyphagous pest, is around millions of dollars (Matis 2006). Potato (Solanum tuberosum L.) is one of the important staple food crops next to rice and wheat in India and adjoining parts of the world. As a result of which production of potato has gone up to a level of 23.6 million tones in 2004-05 from a meager 1.66 million tones in 1950-51 with an increase in area to 1.3 million hectare from only 0.24 million hectare during the period, associated with an increase in productivity by (from 0.692 t.ha-1 to 1.815 t.ha-1) 1.123t.ha-1. The major constraint in potato production is the aphid infestation, globally recognized as the most dangerous towards production of healthy (virus-free) seed for potato. Out of the thirteen aphid species infesting potato crop (Misra and Agrawal, 1991), the green peach aphid, Myzus persicae (Sulzer) and the cotton aphid, Aphis gossypii (Glover) are well known potential vectors of potato virus hence, warrant timely and effective control on crop, particularly grown for seed purposes. In India, the losses in potato yield due to PLRV and PVY have been reported to be 20-50 and 40-85percent, respectively (Khurana and Singh, 1997). The infection pressure of PLRV and PVY are dependant on the aphid population; so the changing population dynamics of aphid population with change in abiotic factors play important role in successful cultivation of potato. Present work is an attempt to model the behaviour of aphid population during the potato season. Ten years of experimental data at farmers' filed is used for the purpose. The study analyses the associationship of occurrence of aphids with the weather parameters. Different forms of associationship with different weather parameters are established. The study also recorded the influences of weather parameters prior to the potato growing season on population dynamics of potato aphids. So far about the model for aphid population dynamics is concerned mostly Logistic and Gompertz growth models have been used to study the nature of the growth in aphid population. A comparative study of the different models in explaining the population dynamics has also been made. The study projected the initiation of aphid population during the 2nd week of December, reaches it peak during 4th week of February or 1st week of March and then declines to vanish during 4th week of March.

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K2

Plenary Session

Monday 5:30pm-6:40pm Room: Baie des Anges

Chair: John Guerard
McKinley Capital Management, Anchorage, Alaska, USA

Modern Portfolio Theory: Foundations and Performance Measurements

1- Portfolio Theory: From 1600 until Now

Harry M. Markowitz, Nobel Prize in Economics

Shakespeare (Merchant of Venice Act 1, Scene 1) had a good grasp of portfolio theory in principle, as did many others at an intuitive level. What was lacking prior to 1952 was an adequate **theory** of diversification, taking into account the fact that investments are correlated. In the half-century plus since then the concepts of efficient diversification in the face of possibly correlated risks has come to pervade financial theory and practice.

Harry M. Markowitz studied at the University of Chicago (Ph.B., 1947; M.A., 1950; Ph.D., 1954) and then was on the research staff of the RAND Corporation in Santa Monica, California (1952–60, 1961–63), where he met Sharpe. He then held various positions with Consolidated Analysis Centers, Inc. (1963–68), the University of California, Los Angeles (1968–69), Arbitrage Management Company, (1969–72), and IBM's T.J. Watson Research Center (1974–83) before becoming a professor of finance at Baruch College of the City University of New York. In 1994 he became a research professor of economics at the University of California, San Diego.

The research that earned Markowitz the Nobel Prize involved his "Portfolio Theory" which sought to prove that a diversified, or "optimal," portfolio - that is, one that mixes assets so as to maximize return and minimize risk - could be practical. His techniques for measuring the level of risk associated with various assets and his methods for mixing assets became routine investment procedures. He also developed a computer language called Simscript, used to write economic-analysis programs.

2- Applications of Markowitz Portfolio Theory to Pension Fund Design

Martin J. Gruber
New York University Stern School of Business, USA

A large amount of research has dealt with the optimum investment choices of pension fund participants in defined contribution plans. However, participants can only allocate funds among the choices they are given by plan administrators. This is the first research to use Markowitz' fundamental work in Portfolio Theory to examine the efficacy of the choices given to participants. We find that administrators don't offer enough choices. We show that while the funds selected by administrators are better than funds selected at random, they are not as good as index funds, and that some administrators are consistently better than others in consistently selecting funds over time. Finally, we find that the actions of plan participants do not add value to the choices that they are given.

Martin J. Gruber is the Nomura Professor of Finance at New York University Stern School of Business. In his current positions, Professor Gruber teaches courses in advanced portfolio theory, investment philosophies, and a Ph.D. seminar in investments. Professor Gruber has been with NYU Stern for more than 35 years. He is coauthor of the best selling text in Finance entitled "Modern Portfolio Theory and Investment Analysis." His primary research areas of interest include mutual funds; performance management; portfolio construction and analysis; portfolio management; and portfolio theory, and he has published numerous articles in publications including *Journal of Finance; Journal of Business; Management Science; Studies in Banking and Finance*; and *Japan and the World Economy*. Professor Gruber is past president of the American Finance Association and is a fellow of the American Finance Association. Professor Gruber received his Bachelor of Science in chemical engineering from Massachusetts Institute of Technology and his Master of Business Administration in production management and his Doctor of Philosophy in finance and economics from Columbia University.

K3

Plenary Session

Tuesday 8:15am-9:10am Room: Baie des Anges

Chair: Pierre Jaillet
Banque de France, Paris, France

Nowcasting and the real time data flow

Lucrezia Reichlin
European Central Bank, Frankfurt, Germany

The presentation is based on several papers in which we propose methods to exploit early releases of timely information to compute an early estimate of current quarter GDP growth (now-casting). The method we will present allows to track both the forecast and its accuracy in correspondence to the real time data flow throughout the quarter. We also propose a method to link this type of conjunctural analysis to structural DSGE models. The latter allows to estimate model based unobserved quantities such as the ouput gap or the natural rate of interest in real time. Relevant bibliography: Giannone, Reichlin and Small, Journal of Monetary Economics 2008; Angelini et al., CEPR working paper, 2008, Giannone, Monti and Reichlin, mimeo ECB 2008.

Lucrezia Reichlin has been Director General of Research at the European Central Bank since March 2005. She is Professor of Economics at ECARES, Université Libre de Bruxelles, currently on leave.
She holds a Ph.D. from New York University (1986) and previously worked at the OFCE in Paris, the Graduate School of Business at Columbia University and at the European University Institute. She is fellow of the European Economic Association and she is member of the scientific committee/council of several research institutions amongst which European University Institute, Bruegel, CREI in Barcelona, CREST in Paris, Fondation Nationale de la Banque de France and the Centre for International Macroeconomics and Finance of the University of Cambridge. She has been CEPR programme co-director for International Economics from 1999 to 2004, the founder of the Euro Area Business Cycle Network and its scientist in charge up to March 2005, member of the Council of the European Economic Association. She is has been in the editorial committee of the Journal of Applied Econometrics, the Journal of the European Economic Association, Economica, Macroeconomic Dynamics. She has published extensively in international journals in applied macroeconomics and time series analysis. Her recent work has been on the development of tools for forecasting and policy analysis in large dynamic models. With her co-authors she has developed theory and estimation methods for large dynamic factor models and, more recently, studied Bayesian shrinkage for large models. Her techniques are widely applied in central banks around the world especially for short-term forecasting and nowcasting. She has been invited to give keynote speeches on her research at several events such as the Royal Econometric Society 2000, the World Congress of the Econometric Society 2000, the Australasian Meeting of the Econometric Society 2006, the 26th International Symposium on Forecasting, 2006 and several conferences at academic and policy institutions.

FIN1

Contributed Session: Financial Modelling I

Tuesday, 09:30am-10:50am Room: Baie des Anges

Chair: Wing Han Iris Yip
Hong Kong University of Science and Technology, Hong Kong

An Empirical Study for Testing Efficiency of Stock Index Historical Volatility Forecasting in Asia-Pacific Region

Noppanon Homsud, Sirina Phuangnark
The Faculty of Management Science Silpakorn University, Thailand

The objective of this research was to test and compare the accuracy of different models in historical volatility forecasting of 11 Asia-Pacific stock indexes using Moving Average, Weight Moving Average, Exponential Smoothing, Least Sqaure, Random Walk, Historical Mean, ARIMA, ARCH, GARCH, TARCH and TGARCH. The sample, which was taken into the model, was the daily data and divided into 2 stages. The data in January 1991 to December 2005 was used for the model building phase while the data in January 2006 to November 2007 was used for the model testing phase. When it was measured error with MSE, the best suitable model from the model building was ARIMA and from the model testing was ARIMA. While it was measured error with HMSE, the best suitable model from the model building was TGARCH and from the model testing was TGARCH. The consideration from the results of this paper was the parameter estimation could give the results of forecasting driving into the same direction between model building and model testing. So this was indication of the efficiency real using.

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Forecasting the Volatility using Heteroskedastic Linear Process

Yu-Pin Hu
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In order to help forecast the volatility of a heteroskedastic series from the information of a large number of relative series, this article proposes a linear transformation on these relative series to produce a process, referred to as the heteroskedastic linear process (HELP). In theory, it can be proved that the HELP contains all the information needed to capture the movement of the second moment. The proposed method is expectantly better than the series extracted by the principal components analysis (PCA) in terms of volatility forecasting. In empirical analysis, the bivariate GARCH models are adopted to compare the HELP and the PCA series, where the bivariate series including the target series and HELP is considered first and then the bivariate series including the target series and the first PCA series. Both simulations and analysis of stock returns show that the HELP outperforms the PCA and other common feature methods.

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Evaluation of hedge fund returns Value-at-Risk using ARCH models

Sabrina Khanniche
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The aim of this research paper is to evaluate hedge fund returns Value-at-Risk by using ARCH models. To perform the empirical analysis, one uses the HFR (Hedge Fund Research) daily performance subindexes split by an investment styles and an aggregate index which encompasses all hedge fund strategies and spans the period January 1st 1994 – October 25th 2007 for Market Directional and Absolute Return strategies and October 31st 2003 – October 25th 2007 for all the other strategies. Secondly, I will make classical econometric tests that lead to ARCH modelling of the risk of hedge funds. On the one hand, the phenomenon of volatility clustering is pointed out. Large changes tend to be followed by large changes and small changes tend to be followed by small changes. On the other hand, one observes a skewness highly negative and a kurtosis highly in excess for all the strategy returns. Finally, it is found an ARCH effect in hedge fund returns distribution. Thirdly, hedge funds risk will be estimated by using linear ARCH models (GARCH) and asymmetric ARCH models (EGARCH, TARCH and TGARCH). To choose the best one, I will focus on the minimization of Akaike and Swartz criterion. Fourthly, I apply the ARCH model (s) considered to estimate the VaR of the different hedge fund styles. In order to judge about the model performance, we backtest the results of the VaR models considered. Finally, one will have to estimate the conservativeness of models in terms of the relative size of VaR for risk assessment. To measure the relative size of VaR among different models, the mean relative bias developed by Hendricks (1996)
can be applied. Indeed, a conservativeness model means the overestimation of the true risk.

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On a Threshold Multivariate GARCH Model

Wing Han Iris Yip, Mike K. P. So
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This paper proposes a threshold multivariate GARCH model (Threshold MGARCH) which integrates threshold nonlinearity, mean and volatility asymmetries and time-varying correlation in financial markets. The main feature of this model is that the mean, volatility and time-varying correlation can be governed by different threshold variables with different number of regimes. Estimation is performed using Markov Chain Monte Carlo methods. Forecasts of volatility and value at risk can be generated from the predictive distributions. The proposed methodology is illustrated using both simulated and actual international market with high dimensional data.

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EBC20

Invited Session: Forecasting with Real Time Data and Revisions

Tuesday, 09:30am-10:50am Room: Clipper

Chair: Simon Price
Bank of England, UK

Nowcasting, Business Cycle Dating and the Identification of Policy Shocks using Information available in Real Time

Kevin Lee
University of Leicester, UK

Nilss Olekalns, Kalvinder Shields
University of Melbourne, Australia

A modelling framework is proposed in which the real time informational context of decision-making is properly reflected. Comparisons are drawn with `standard' estimated models that incorrectly omit market-informed insights on future macroeconomic conditions and inappropriately incorporate information that was not available at the time. An analysis of quarterly US data 1968q4-2006q1 shows that neither diagnostic tests applied to the standard models nor typical impulse response analysis are able to expose the misspecification clearly. Estimated real time models considerably improve out-of-sample forecasting performance, provide more accurate `nowcasts' of the current state of the macroeconomy and provide more timely indicators of the business cycle. A case study highlights the use of information in recognising the US recessions of 1990q3 -- 1991q2 and of 2001q1 -- 2001q4.

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Real-Time Benchmarks for Central Bank Forecasts in the Presence of Model Uncertainty

Anthony Garratt
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Roger Hammersland
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Shaun Vahey
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We provide a tool to help assess a central bank's forecast applicable to point and density forecasts in the presence of benchmark model uncertainty. The Bayesian Information Theoretic Indicator (BITI) uses a predictive likelihood measure of fit to evaluate the published forecasts. For a range of benchmark models and for the central bank projections, we calculate out-of-sample forecast errors from which we construct the Bayesian Information Criterion (BIC). For each benchmark, we approximate the posterior odds in favour of the Bank's forecast using the BIC. We use Bayesian Model Averaging to integrate out the uncertainty about which benchmark is appropriate. In our real-time BITI applications, we gauge the performance of Norges Bank and the Bank of England projections against a benchmark set of VARs and VECMs.

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Combining Forecast Densities from VARs with Uncertain Instabilities

James Mitchell
National Institute of Economic and Social Research, London, UK

Anne Sofie Jore
Norges Bank, Oslo, Norway

Shaun Vahey
Melbourne Business School, Australia

Clark and McCracken (2008) argue that combining real-time point forecasts from VARs of output, prices and interest rates improves point forecast accuracy in the presence of uncertain model instabilities. In this paper, we generalize their approach to consider forecast density combinations and evaluations. Whereas Clark and McCracken (2008) show that the point forecast errors from particular equal-weight pairwise averages are typically comparable or better than benchmark univariate time series models, we show that neither approach produces accurate real-time forecast densities for recent US data. If greater weight is given to models that allow for the shifts in volatilities associated with the Great Moderation, predictive density accuracy improves substantially.

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Forecasting with a model of data revisons

Simon Price, Jana Eklund
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George Kapetanios
University of London, UK

Macroeconomic data are subject to revisions in successive releases. Those releases may be predictable; and the evidence is that they are in the UK. We use a state-space model of the revision process to estimate what will be the final release of the data, using the Kalman filter. A real-time database is used to generate an estimate of the `backcast', and we can then in turn construct a real-time data base of those backcast series. These are used to generate forecasts of whole economy investment and GDP growth for the UK, which are then compared to standard benchmarks in a real-time forecast comparison exercise.

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ENR9

Invited Session: Wind Power Forecasting

Tuesday, 09:30am-10:50am Room: Fregate

Chair: Ismael Sánchez
Universidad Carlos III de Madrid, Spain

From meteorological ensembles to reliable probabilistic forecasts of wind generation

Pierre Pinson, Henrik Madsen
Technical University of Denmark, Denmark

Significant variability and limited predictability of wind power production make its optimal management a challenge for the various actors of the energy sector. The necessity of making decisions from forecasts (with forecast length up to 48-72 hour ahead) is already recognized, while the additional benefits coming from the consideration of reliable and situation-specific information on forecast uncertainty are being demonstrated for a large range of decision-making problems. It appears today that the most appropriate way of estimating and communicating forecast uncertainty is with probabilistic forecasts, i.e. forecasts of the probability distribution (or some of its quantiles) of wind generation for each look-ahead time. The resolution of such probabilistic forecasts, that is, their ability to resolve among situations with various level of uncertainty, can be maximized by using meteorological ensemble predictions as input. Meteorological ensembles consist of a set of (ideally equiprobable) scenarios for the coming period. Ensemble forecasts of wind power can be obtained by passing ensemble forecasts of meteorological variables through a suitable power curve. This power curve is modeled here with local linear regression, the coefficients of which are adaptively and orthogonally fitted. The obtained ensemble forecasts of wind power can then be converted into nonparametric predictive distributions with adaptive Kernel dressing. Kernels to be attached to each ensemble members are parameterized with a mean–variance model accounting for known characteristics of wind power prediction uncertainty. These parameters are then adaptively estimated with a recursive Bayesian moving average method. This complete methodology for probabilistic forecasting is applied to the test case of the Horns Rev offshore wind farm in Denmark, over a period of one year. It is shown that the obtained nonparametric predictive distributions from the set of ensemble members are reliable, and exhibit a high resolution. Perspectives regarding further works will finally be given.

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Short-term density forecasting of wind power generation using time series models

Ada Lau
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Patrick McSharry
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We study the ability of statistical models to generate density forecasts of short term wind power generation at a single wind farm, Sotavento Galicia in Spain, with forecast horizons out to six hours ahead. The models are compared by assessing their performance in providing both accurate point forecasts and density forecasts with appropriate degrees of sharpness and calibration. Density forecasts are of particular interest since they offer comprehensive information for analysing the risk associated with wind power variability. We construct time series models which take account of dynamical characteristics such as regime switching and seasonality. In addition, we compare the advantages and disadvantages of forecasting wind power generation using univariate models with that of transforming wind speed forecasts to wind power forecasts using an empirically estimated power curve. Forecast performance is assessed relative to benchmarks such as a simple persistence forecast and an ARMA model.

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Powering Up with Space-Time Wind Forecasting

Amanda S. Herin
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Marc G. Genton
University of Geneva, Switzerland

The technology to harvest electricity from wind energy is now advanced enough to make entire cities powered by it a reality. High-quality short-term forecasts of wind speed are vital to making this a more reliable energy source. Gneiting et al (2006) have introduced an accurate and sharp model for forecasting the average wind speed two hours ahead based on both spatial and temporal information; however, this model is split into nonunique regimes based on the wind direction at an off-site location. This paper both generalizes and improves upon this model by treating wind direction as a circular variable and including it in the model. It is robust in many experiments, such as predicting at new locations and under rotations of the wind directions. We compare this with the more common approach of modeling wind speeds and directions in the Cartesian space and use a skew-t distribution for the errors. The quality of the predictions from all of these models can be more realistically assessed with a loss measure that depends upon the power curve relating wind speed to power output. This proposed loss measure yields more insight into the true worth of each model's predictions.
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Adaptive density estimation of wind power predictions

Ismael Sanchez
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This work develops a procedure for the on-line estimation of the density function of wind power predictions. The procedure is based on the online estimation of a set of conditioned moments of the prediction distribution. The conditioned moments are modelled in a similar fashion as the conditioned variance in ARCH models, but applied also to the third and forth conditioned moments. The on-line estimation is performed using adaptive algorithms. Once the conditioned models are estimated, a parametric density distribution is adjusted using a flexible family of distributions. The methodology is justified by the actual properties of prediction errors found in alternative wind farms, and its behaviour is also illustrated with real data.

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TRA2

Invited Session: Tourism Forecasting Competition

Tuesday, 09:30am-10:50am Room: Le Gallion

Chair: Haiyan Song
Hong Kong Polytechnic University, Hong Kong

Forecasting Accuracy of Time Varying Parameter Structural Time Series Models

Haiyan Song, Stephen F. Witt, Wei Guo
Hong Kong Polytechnic University, Hong Kong

Gang Li
University of Surrey, UK

Tourism is one of the most important economic activities and contributes significantly to the economic growth of many countries/areas. Comprehensive analysis of the economic determinants and accurate forecasting of tourism demand are of particular importance to the planning of various tourism-related activities given the perishable nature of the tourism product. Previous research has demonstrated that the modelling of seasonality and the choice of explanatory variables have considerable impacts on the accuracy of tourism demand forecasting. Nevertheless, the seasonal changes in tourism demand are not always regular or keep constant and the impacts of explanatory variables on tourism demand vary over time. In order to capture the dynamic nature of seasonality in the tourism demand data, the structural time series model (STSM), which relaxes the assumption of deterministic seasonality, and regards seasonality, trend and cycle as stochastic, is considered. However, in the standard STSM, the coefficients of the explanatory variables are estimated using a fixed-parameter technique. In the commonly used log-linear regression form, this implies that the elasticities of tourism demand are assumed to be constant over time, which is unrealistic. The time varying parameter (TVP) modelling approach relaxes the restriction on the constancy of the coefficients of the explanatory variables and allows for stochastic parameters so that the model can better reflect the evolution of demand elasticities over time. This study combines the STSM with the TVP technique (TVP-STSM) to forecast the quarterly demand for Hong Kong tourism by tourists from ten key origin countries/regions. The empirical results of this study show that TVP-STSM outperforms the naïve 'no change' model, which is used as the benchmark in the comparison. TVP-STSM also outperforms other forecasting models including the SARIMA, ADLM and VAR models. Furthermore, the combined TVP-STSM model outperforms both the TVP and STSM techniques in many cases.

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The tourism forecasting competition

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Haiyan Song
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We evaluate the performance of various methods for forecasting tourism demand. The data used include 380 monthly series, 427 quarterly series and 530 yearly series, all supplied to us by tourism bodies or by academics from previous tourism forecasting studies. The forecasting methods implemented in the competition are univariate and multivariate time series models, econometric regression methods and artificial intelligence approaches. Each method is implemented by experts in its field. We evaluate the forecasting performance of each method both in terms of accuracy of point forecasts and in terms of appropriate coverage of prediction intervals. The time series methods we consider are the naive and the seasonal naive methods (which form natural benchmarks), univariate ARIMA models, innovations state space models for exponential smoothing, and vector autoregressions. The econometric methods implemented are a general-to-specific approach to the general autoregressive distributed lag models, and time varying parameter models. From the pool of artificial intelligence approaches, an extensive evaluation of all the possible topologies of multiple layer perceptrons will be conducted via commercial artificial neural networks

(ANNs) software. ANNs will be used on single time series (being trained by past values of the same series) as well as in a causal mode where input variables will be the same independent variables being used in the econometric models. In summary this forecasting competition differs from previous competitions in several ways: (i) we concentrate only on tourism demand data; (ii) we include econometric approaches; (iii) we consider a wide range of artificial intelligence methods; and (iv) we evaluate prediction interval coverage as well as point forecasts.

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Collaborative Forecasting for Tourism Supply Chains via Internet

Alina X. Zhang, Haiyan Song, Stephen F. Witt
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The present study establishes a widely accessible web-based tourism demand forecasting system using the collaborative forecasting method in the context of tourism supply chain (TSC) management. Collaborative forecasting is based on the concept of cooperation and information sharing among TSC members. Using the web technology, this forecasting system can facilitate communication among the TSC members. The forecasting process begins with the baseline forecasts generated by modern econometric/time series techniques embedded in the web-based forecasting system. A number of TSC members are then invited to make forecasts based on their individual views about the baseline forecasts. The system then generates collaborative forecasts by combining both the baseline forecasts and the forecasts generated by the TSC members. The software architecture, system components, and the development environment of the forecasting system are described in details in the paper. The prototype system has been developed and screen shots of interactions within the system are presented using the Hong Kong tourism industry as an example.

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Tourism Forecasting: Accuracy of Alternative Econometric Models Revisited

Haiyan Song
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Egon Smeral
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This study evaluates the forecasting accuracy of five alternative econometric models in the context of predicting quarterly demand for international tourism in 25 major destination countries. Tourism demand is measured in terms of real expenditures by international inbound visitors in the destination country (tourism exports at constant prices and exchange rates). Compared with tourist arrivals, forecasts of tourist expenditures are considered relatively more useful for economic planners and economic policy-makers in terms of assessing the economic impact of tourism. Two univariate time series models are also evaluated for benchmark comparison purpose. Since quarterly data are used, seasonality is an important feature of the forecasting models that requires careful handling in this study. For each of the 25 destinations, individual models are estimated over the period 1980Q1-2005Q1 and the forecasting performance is assessed using the data for the period 2005Q2-2007Q1. The empirical results show that the time varying parameter (TVP) model provides the most accurate 1-4 quarters-ahead forecasts, while the naïve no-change model performs best for 5-8 quarters-ahead forecasts.

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ENR4

Contributed Session: Oil Prices

Tuesday, 09:30am-10:50am Room: Le Mistral

Chair: Maral Kichian
Bank of Canada, Ottawa, Canada

Forecasting Oil Price Movements with Crack Spread Futures

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In oil markets, the crack spread refers to the crude-product price relationship. Refiners are major participants in oil markets and they are primarily exposed to the crack spread. In other words, refiner activity is substantially driven by the objective of protecting the crack spread. Moreover, oil consumers are active participants in the oil hedging market and they are frequently exposed to the crack spread. From a different perspective, hedge funds are heavily using crack spread to speculate in oil markets. In the previous literature, it is shown that the crude oil futures explained the sizable amount of oil price movements. However, based on the high volume of crack spread futures trading in oil markets, the question we want to arise is whether the crack spread futures can be a good predictor of oil price movements. In our research, we investigated first whether there is a causal relationship between the crack spread futures and the spot oil markets in a vector error correction framework. We found the causal impact of crack spread futures on spot oil market both in the long- and the short-run after April 2003 where we detected a structural break in the model. To examine the forecasting performance, we use the random walk model (RWM) as a benchmark, and we also evaluate the forecasting power of crack spread futures against the crude oil futures. Both crack spread futures and the crude oil futures outperformed the RWM. According to our results, the contribution to the literature is that the crack spread futures are almost as good as crude oil futures in predicting the movements in spot oil markets.

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Forecasting oil products prices with threshold effects

Frédéric Lantz, Emannuel Hache
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The use of cointegration techniques is now familiar to estimate the relationships between oil products and crude oil prices. Then, the error correction models could be used to forecast the oil product prices. However, the growing international trade of oil products between the three main markets -North America, Europe, Asia- makes that these prices interact over the three places. Consequently, we integrate these interactions through a threshold effect in the short term model and forecast.

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Oil Prices: Heavy Tails, Mean Reversion and the Convenience Yield

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Sebastien McMahon
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Empirical research on oil price dynamics for modeling and forecasting purposes reveals several issues that are still unsettled. Thus while researchers in this field almost unanimously acknowledge heavy tails and structural breaks - in prices or in returns - as stylized facts, there are many alternative time-series models that are suitable for capturing these features, and this makes model specification daunting. Indeed, in published work, statistical support is claimed for models of price paths that differ even with respect to their fundamental temporal properties. In this paper, we study one such property that is still debated in the literature, namely mean-reversion, with focus on forecast performance. Because of their impact on mean-reversion, we also account for non-constancies in the level and in volatility. Three specifications are considered: (i) random-walk models with GARCH and normal or student-t innovations, (ii) Poisson-based jump-diffusion models with GARCH and normal or student-t innovations, and (iii) mean-reverting models that allow for uncertainty in equilibrium price. The latter specification is driven by a time-varying model for the convenience yield. We compare forecasts in real time, for 1, 3 and 5 year horizons. For the jump-based models, we rely on numerical methods to approximate forecast errors. Results based on future price data ranging from 1986 to 2007 strongly suggest that imposing the random walk for oil prices has pronounced costs for out-of-sample forecasting. Evidence in favor of price reversion to a continuously-evolving mean underscores the importance of adequately modeling the convenience yield.

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ICT3

Invited Session: Telecom Forecasting

Tuesday, 09:30am-10:50am Room: Les Courants

Chair: Kjell Stordahl
Telenor, Norway

Forecasting the ICT Market using the Simultaneous Multiequation Modelling Approach

Mohsen Hamoudia
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New technologies, more aggressive competition, full deregulation and liberalization, new consumer behaviours and expectations, new players and multiple substitution effects have caused increasing complexity and difficulties in modelling and forecasting products and services in IT and Telecommunication Industry. These constraints were not adequately integrated in the "traditional" modelling and forecasting processes (i.e. multiple regression, time series with transfer function, diffusion models etc) and led to inconsistent and inaccurate forecasts, with corresponding shifts in supply and demand. Most attempts to model the Telecoms and ICT markets have concentrated on the demand side. Only a few simultaneous modelling studies have been carried out on both demand and supply. Of these, the majority were at a highly aggregated level. Following two works done in 2006 and 2007, we present in this paper an enhanced forecasting model based on a system of simultaneous multiple regression equations, establishing various linkages between, on one hand, the demand for a variety of ICT products and services and, on the other, the supply and the socioeconomic environment. Estimation procedure will use methods such as Indirect Least Squares (ILS), Instrumental Variable (IV), Two Stage Least Squares (2SLS) and Three Stage Least Squares (3SLS). This paper explicitly models different Telecom and ICT products and services rather than an aggregate of the various "Telecoms" or "ICT" products and services considered as a whole.

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Predicting ICT using Individual Level Model

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We investigate how individual consumer choice of new Information Communication Technology (ICT) varies based on the price and composition of competing options, as well as on the inherent characteristics of the individuals. The main objective of our research is to estimate models for individual decision makers directly using extra preference information collected in Discrete Choice Experiments (DCEs) and to compare how well individual estimates from posterior distributions of aggregate models (e.g. Hierarchical Bayes, mixed logit) (a) predict in rigorous split-half comparisons and b) cross-validate/predict from one sample to another sample . We illustrate usefulness of individual level model using ICT i.e. cellular phones.

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Handling uncertainty in market and technology forecasts in wireless broadband rollout business case analyses

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Mobile operators are pursuing strategies for enhancing their revenue base with wireless personal broadband services. In emerging markets where broadband penetration is still low due to a present low PC penetration and little or no fixed access network infrastructure, various wireless network technogies such as 3G/HSDPA, WiMAX and WiFi are natural choices in enabling wireless broadband services to consumers and businesses. As the broadband penetration is still low in emerging markets, the future broadband market is an important growth option for mobile operators using their existing infrastructure assets as a base for expansion. Various strategic paths for a 2G operator are analysed in terms of cash flows, where timing and choice of wireless technologies are major decision variables. Such investment projects inherently contain flexibility. Adjusted NPVs are calculated by using Real Options Analysis (ROA) which incorporates managerial flexibility into the investment decision and are based on simulated volatilities and the framework of the binomial asset pricing model.Uncertainty is modeled by first estimating probability distributions for critical assumption variables such as service adoption rate of wireless personal broadband services, penetration of laptops with built-in WiMAX antennas, cost evolution of wireless access network equipment, ARPU and operational costs. The volatility – the overall uncertainty metric - is calculated by performing Monte Carlo analyses of the logarithmic present value. In addition to the volatility itself, which is the standard deviation of the logarithmic present value found from this simulation, this approach also determines a measure of how each assumption variable is contributing to the volatility by using rank correlation. The adoption rate forecasts, which are modeled by logistic models, are among the highest ranked uncertainty assumptions in telecommunications investment projects. Therefore reliable forecasts are instrumental in obtaining trustworthy estimates of NPVs adjusted with the value of flexibility.

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Long-term broadband access forecasting and the influence of new technologies

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Huge investments have been used to roll out broadband networks during the recent years. Long-term broadband demand forecasts have been and are crucial for investments decisions, rollouts and dimensioning of the networks. The main broadband access technologies have been DSL and Cable modem (Hybrid Fiber Coax). Also other technologies like fiber (FTTx) and fixed radio access are entering the market. Especially in Japan, Hong Kong and Korea, the growth of FTTx has been significant during the last years. However, the fiber access evolution in Western Europe has been quite modest. Some exceptions are the Scandinavian countries. DSL has limited coverage and in many countries the Cable TV networks and the cable modem upgrading are limited to densely populated areas. To cover the residual broadband market, technologies like WiMAX and mobile broadband are needed. Long-term broadband access forecasting models for the Western European market will be presented. The forecasting models are based on four parameters Logistic models and substitution effects between demands for different broadband technologies. Dependence of the size of the residual broadband market is build into the model. For mobile broadband limited demand data, so far, are available. Substitution effects between fixed and mobile broadband will be analyzed. In addition specific attention is put on FTTx which is the long-term ultimate broadband solution. The long-term FTTx forecasts for Western Europe are based on a set of assumptions like time delay, regulatory aspects, degree of densely populated areas etc. The access forecasts for Western Europe show that the dominating technology DSL in the long run will start to loose market share.

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MTD1

Contributed Session: Forecasting Methods I

Tuesday, 09:30am-10:50am Room: Sirocco

Chair: Dirk Ulbricht
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Is Aggregation Necessarily Bad? (with apologies to Grunfeld and Griliches)

Geoffrey Allen, Moonyoung Baek, Bernard Morzuch
University of Massachusetts, USA

With high frequency data (e.g., hourly), when decisions are based on lower frequency aggregates (e.g., four-hourly intervals) the possibilities are to aggregate the data then directly forecast the aggregates, or indirectly to estimate the disaggregate series then aggregate the forecasts. No clear principle has emerged concerning this choice, and past empirical work has produced conflicting results with no indication as to what circumstances might favor one approach over the other. Aggregating the data amounts to throwing away information. On the other hand, if the amount of noise in the disaggregate data swamps any additional signal, parameter estimates are more difficult to make. The added uncertainty leads to less accurate forecasts. For the two series examined, hourly arrivals at a hospital emergency room, and hourly electricity load data, results are fairly consistent. More accurate forecasts are obtained from estimating and forecasting the disaggregate data and aggregating the forecasts compared with estimating and forecasting using aggregate data. The variation over a typical day and the day-to-day variation through the week are greater for the electricity data than for the emergency room arrivals. The differences between the series are apparently not large enough to affect the preferred strategy of disaggregate estimation and forecasting.

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Combination of forecasting methods using encompassing tests: an algorithm-based procedure

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This paper proposes a strategy to increase the efficiency of forecast combing methods. Given the availability of a wide range of forecasting models for the same variable of interest, our goal is to apply forecast combining methods to a restricted set of models, selected as to minimize any loss of information. In this view, our approach differs from most of the literature on the combining of forecasts since it suggests reducing the number of available forecasts before combining them. To this aim, starting from the contribution of Kisinbay (2007), this paper proposes an algorithm that is based on widely used encompassing tests (Harvey, Laybourne, Newbold, 1997). Rather than for evaluating forecasts, the above statistics are implemented to select the subset of forecasts to be combined. According to the procedure we suggest, overall forecasting models are first ranked according to a measure of predictive accuracy (RMSE) and, in a consecutive step, each prediction is chosen for combining only if it is not encompassed by the competing forecasting models. In this view, widely used forecast combing procedures proposed in the empirical literature have been implemented. To asses the robustness of this procedure, an empirical application to Italian monthly industrial production is provided. We exploit several short-term forecasting models currently used at ISAE, which consists in single-equation, VAR and factor models, based on several suitable industrial production indicators. ARIMA model is chosen as a benchmark one. Models are used to provide forecasts up to 6 steps ahead, both in a recursive and rolling regression framework. The results are reassuring as the algorithm forecasts outperform both benchmark (ARIMA) model and, overall combination of forecasts, in terms of an indicator of predictive accuracy (RMSE), in a majority of cases.
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Combined Forecasts in the Presence of Structural Breaks

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Structural changes are a major challenge to the applied forecaster and a potential source of large forecast errors. Nonetheless, large forecasting competitions demonstrate the success of combined forecasts of simple linear models over forecasting devices that endogenously model structural change. However, common combination schemes still only provide a limited hedge. This paper tries to further robustify combined forecasts. In a pseudo-out-of sample real time analysis UK inflation is recursively predicted employing a wide range of OLS models. Using the recently developed forecast breakdown test (Rossi and Giacomini, 2005) it is demonstrated, that the models' performance collapse at different points in time and that there are always some models that do not suffer a forecast breakdown. The persistence in the forecast breakdowns is used to predict performance and to preselect the models that enter the combination scheme. Both, the empirical analysis as well as a simulation study demonstrate the usefullness of the approach.

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ELE1

Invited Session: Forecasting French Elections

Tuesday, 09:30am-10:50am Room: Azur

Chair: Bruno Jérôme
University of Paris II Pantheon Assas, France

Forecasting the Extreme Right vote in France (1984-2007)

Gilles Ivaldi
Université de Nice-Sophia Antipolis, France

Jocelyn Evans
University of Salford, UK

We identify an issue model forecasting Extreme Right results in France between 1984 and 2007. The model is based on two of the key issues which are motivating the FN vote (unemployment and immigration) and controls for political context through election type and opposition popularity. We find that the vote is linked to variation in macro-indicators of these issues and that consequently the Extreme Right vote in France is far from unpredictable, particularly with regard to the crucial elections of 2002 and 2007 where the FN reached an 'unexpected' electoral apex before experiencing a similarly severe 'shock' setback. The dynamics of the 2007 are then explored further using departmental and regional level data.

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Forecasting the winners in each of the 577 districts of the French legislative elections with the spatial voter's model of Downs

Bertrand Lemennicier, Honorine Lesieux
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"The basic determinant of how a nation's political life develops is the distribution of voters along the political scale". So wrote Anthony Downs (1957) in his famous essay on democracy. Downs used the spatial model of Harold Hotelling (1929) with a linear scale in a left-to-right direction with single-peaked voter's preferences. In such a model, the median voter plays a key role in shaping the public policies that the winner of election will implement during his mandate, if he keeps his promises. In a poly modal distribution of votes along the political scale, we need to concentrate not only on the location of the median voter of the overall distribution of votes but also on the location of the median voter of each camp on the left or on the right of the political scale. The idea is that the winner is the one whose median voter of his camp is at the shortest distance to the median voter of the over all distribution of votes. Knowing that in a plurality of political parties, any shift of the candidate towards the middle of the road or to the median voter of the all distribution of votes is paid by a loss of votes on his left for the left camp and on his right for the right camp. If the loss is too high, the candidate may not be selected at the first round. This is the constraint on the behaviour of the candidate expecting to be elected. We test this hypothesis on the 577 districts of the election of the French members of the parliament.

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Bread and Butter à la Française: Forecasts of the French Legislative Vote from Regional Economic Conditions

Kai Arzheimer
University of Essex, UK

Jocelyn Evans
University of Salford, UK

It is well known that citizens tend to blame the government for economic hardship, and that they see legislative elections as an opportunity "to throw the rascals out". However, while this mechanism has been thoroughly explored as a basis for election forecasting in the US and many Western European countries , less research has been carried out on the semi-presidential case of France. In a bid to shed some light on this question over time, we try to predict support for the incumbent parties in French legislative elections from regional economic conditions and political traditions. Building upon work by Auberger and Jerome and Jerome-Speziari, we look for evidence of variation at departmental level in support for incumbent parties and economic indicators such as unemployment and inflation, lagged by previous election score. We then assess the model's efficacy in retrodicting first-round legislative election results in France.

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Forecasting Presidential Elections from Candidates' Positions

J. Scott Armstrong
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Andreas Graefe
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Ideally, presidential elections should be decided based on how the candidates will respond to the issues facing the country. If so, knowledge of the candidates' positions should help to forecasts their appeal to voters. We predict the 2008 US Presidential Election by analyzing the candidates' positions on issues by using the index method. The index method provides an alternative to regression models. Indexes are expected to be advantageous to regression models for situations involving many causal variables, good knowledge about the variables, and limited availability of data. Our work extends prior research showing that index methods can provide valuable forecasts of election outcomes; however, the prior research did not focus on issues. We are unaware of any studies that analyze the candidates' positions on issues in order to predict the election outcome. We will report on our application of the index method to the 2008 presidential election.

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ENR3

Contributed Session: Electricity Load Forecasting

Tuesday, 11:10am-12:10pm Room: Baie des Anges

Chair: Vincent Lefieux
Réseau de Transport d'Electricité, France

Autoregressive models in short term load forecast: A comparison of AR and ARMA

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Short-term load forecasting plays an important role in planning and operation of power system. The accuracy of this forecasted value is necessary for economically efficient operation and also for effective control. This paper describes a comparison of autoregressive moving average (ARMA) and autoregressive (AR) Burg's and modified covariance (MCOV) methods in solving one week ahead of short term load forecast. The methods are tested based from historical load data of National Grid of Malaysia and load demand in New South Wales, Australia. The accuracy of discussed methods are obtained and reported.

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Non-parametric load forecasting by « aggregation / disaggregation »

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The installation planed from now to 2016 of more than 34 millions of communicating meters of all of Electricité De France' consumers should allow a better analysis of the EDF customers' spending patterns. We could also analyze "on line" consumption on more or less incorporated levels and forecast it in order to adapt the production and the potential purchases on the electricity markets. Indeed, these meters will be used like sensors in order to measure all the load curves of each customer to very fine temporal granularities (going until the minute, even the second). Today, only a few tens of thousands of customers have meters to recover curves with measurements every half-hour, even every ten minutes. In this framework, we were working on a new methodology for the short-term load forecasting by "aggregation / disaggregation", using load individual curves after an appropriate elaboration of a clustering of these curves. Then, in this work, we will present a non-parametric kernel forecasting methodology which aggregate forecasts of each curve using its own past and the past of each curve of her own cluster. The weighting will be based on a kernel applied to the similarities of the reference window with all same size windows in the explored past , and the similarity of the curve with the other curves in her cluster.

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Application of semiparametric modelling to times series forecasting. Case of the electricity consumption

Vincent Lefieux
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Réseau de Transport d'Electricité (RTE) is in charge of the operation of the French electricity transmission system and therefore needs to elaborate accurate forecasts of the electric power consumption. Daily forecasts are achieved thanks to a statistical model which combines nonlinear parametric regression and SARIMA modelisation. In order to obtain an adaptive forecasting model, nonparametric forecasting methods have already been tested without real success. In particular, it is well known that a non-parametric predictor behaves badly when a lot of explanatory variables exist. This phenomenon is commonly called "curse of dimensionality". Recently, semi-parametric methods have been proposed to estimate regression functions. Based on the concept of "'index", one of those methods called MAVE (Moving Average conditional- Variance Estimate) can be appplied to time series. We studied its efficiency to forecast the future values of an autoregressive time series. In this paper, we give some ergodicity results on such time series, and show results for classical time series. We then adapted this method to forecast power consumption time series. In this paper, we evaluate a semi-linear and semi-parametric model, partially based on the MAVE method, which allows to take into account both the autoregressive property and the exogenous variables. Numerical results are given for the French electric power consumption.

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EBC15

Invited Session: Short-Term Forecasting Tools for Economic Growth

Tuesday, 11:10am-12:10pm Room: Clipper

Chair: Laurent Ferrara
Banque de France, Paris, France

Monthly forecasting of French GDP: A revised version of the OPTIM model

Olivier Darné
Université Paris 10 and Banque de France, Paris, France

Karim Barhoumi, Laurent Ferrara, Bertrand Pluyaud
Banque de France, Paris, France

This paper presents a revised version of the model OPTIM used at the Banque de France in order to predict French GDP quarterly growth rate and its main components (supply and demand sides), for the current and next quarters. The model is designed to be used on a monthly basis by integrating monthly economic information (hard and soft data) through bridge models, providing an accurate and timely assessment of GDP growth rate. For each GDP component, bridge equations are specified by using a general-to-specific approach implemented in an automated way. This approach allows selecting explanatory variables among a large data set of hard and soft data. We predict each of the main components of both supply and demand sides of the national accounts and then to aggregate them. This decomposition provides more precise quantitative information allowing thus a better and earlier understanding of the economic situation. A rolling forecast study is carried out to assess the forecasting performance of the revised OPTIM model in the prediction of aggregated GDP, by taking publication lags into account in order to run pseudo real-time forecasts. It turns out that the model outperforms benchmark models.

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Using aggregate or disaggregate data for factor analysis in forecasting French GDP

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This paper compares the forecasting performance of alternative factor models based on monthly time series for the French economy. These models are based on estimated static and dynamic principal components. The dynamic principal components are obtained using time and frequency domain methods. The forecasting accuracy is evaluated in two ways for the GDP growth. First, we question whether it is more appropriate to use aggregate or disaggregate data (with two disaggregating level) to extract the factors. Second, we focus on the determination of the number of factors obtained either from various criteria or from a fixed choice.

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Identification of slowdowns and accelerations in the Euro area economy

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In this paper, we focus on the acceleration cycle in the euro area, namely the identification of slowdown and accelerating phases of the euro economy. Economic accelerations and decelerations are very important for short-term analysts aiming at orecasting GDP growth rate. The objective of this paper is twofold. First, we measure the main characteristics of the acceleration cycle in the euro area and we propose a monthly turning point chronology for this cycle, mainly based on non-parametric methods. Second, we develop a monthly probabilistic turning point index able to track in real-time the peaks and troughs of the acceleration cycle. This index is based on both euro-aggregated and country-specific business opinion surveys. Several Markov-Switching models able to take into account the asymmetry of the cycle in a multivariate framework are considered.

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CLI4

Invited Session: Climate Forecasting and Public Policy

Tuesday, 11:10am-12:10pm Room: Fregate

Chair: J. Scott Armstrong
University of Pennsylvania, USA

Are existing long term climate forecasts useful for policymakers?

Kesten C. Green
Monash University, Australia.

J. Scott Armstrong
University of Pennsylvania, USA

The United Nations' Intergovernmental Panel on Climate Change issued forecasts of dangerous manmade global warming. In response, governments around the world have proposed expensive policies. We conducted a forecasting audit in order to examine the validity of global warming forecasts as a basis for public policy.

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On the validity of forecasting audits

Paul Goodwin
University of Bath, UK.

To what extent do forecasting audits apply across different types of problems? I examine the extent to which the existing forecasting audit applies to problems in physical and social sciences, as well as to the commercial sector.

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Are forecasts by U.S. government scientists valid evidence upon which to base the decision to classify polar bears as an endangered species?

J. Scott Armstrong
University of Pennsylvania, USA

Kesten C. Green
Monash University, Australia.

Willie Soon
The Harvard-Smithsonian Center for Astrophysics, USA

One policy that has been proposed in response to dangerous manmade global warming forecasts is to list polar bears as threatened or endangered under the U.S. Endangered Species Act. In September 2007, the U.S. Fish and Wildlife Service provided nine administrative reports to support of the polar bear listing. We conducted an audit of the reports' polar bear forecasts.

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EBC19

Invited Session: Dynamic forecasting with VAR models

Tuesday, 11:10am-12:10pm Room: Le Gallion

Chair: Katrin Assenmacher
Swiss National Bank, Zurich, Switzerland

Do monetary indicators lead euro area inflation?

Boris Hofmann
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This paper assesses the performance of monetary indicators as well as of a large range of economic and financial indicators in predicting euro area HICP inflation out-of-sample over the period first quarter 1999 till third quarter 2006 considering standard bivariate forecasting models, factor models, simple combination forecasts as well as trivariate two-pillar Phillips Curve forecasting models using both ex-post revised and real-time data. The results suggest that the predictive ability of money-based forecasts relative to a simple random walk benchmark model was high at medium-term forecasting horizons in the early years of EMU, but has substantially deteriorated recently. A significantly improved forecasting performance vis-à-vis the random walk can, however, be achieved based on the ECB's internal M3 series corrected for the effects of portfolio shifts and by combining monetary and economic indicators.

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Business cycle indicators in VARs for a quarterly forecasting model of the Italian economy

Carmine Pappalardo
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Ciro Rapacciuolo
Confindustria, Roma, Italy

Anna Ruocco
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We build a small-scale econometric model for short term forecasting of Italian economic developments. The idea is to forecast quarterly GDP and its components from the demand side by means of a small set of business cycle indicators, both quantitative and qualitative (a total of 19 series). For most relations we adopt a VAR specification. In this framework it's not necessary to look for leading properties in the indicators but simply for close relationships with the endogenous variables. The estimation procedure entails first the use of very small subsets of the indicators to foresee each elementary GDP component. Then we progressively aggregate the various component forecasts by means of bridge equations estimated on accounting relations, finally getting a GDP forecast. An additional GDP relation from the supply-side is also derived.The model focuses on real developments, abstracting from financial and monetary aspects. We use quarterly data from 1980:1 to 2007:1, working days and seasonally adjusted. The (log) differenced data show not very strong causal links and low autocorrelation but a convenient stationarity. The main issues relate to: the loss in the chain-linked variables of the property by which each aggregate corresponds exactly to the sum of its components; the absence of a series for the change in inventories. To get a reliable demand side GDP forecast, we estimate an equation with the sum of inventories and the statistical discrepancy as the endogenous variable, then disentangling these two components.The model made up of twenty-one estimated relations forecasts GDP and components four quarters ahead. It also produces forecasts unadjusted for working days to allow comparisons with annual models. Forecasting ability exercises show that the model beats quite easily ARMA models also in the first quarter. We also show comfortable robustness of the forecasts to the revisions of GDP and components data.

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Forecasting Macroeconomic Variables with a Categorical Latent Variable Based on the ISM Index

Katrin Assenmacher, Marlene Amstad
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Michael J. Dueker
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The ISM index is a widely-cited economic indicator that is thought to provide information about the future course of the economy. Press citations of this indicator focus mainly on whether the index is above or below 50. As the index approaches 50 from above,this is seen as a possible harbinger of a business cycle turning point. For this reason, a move in the ISM index from 53 to 51 would have more impact on people's expectations than a move from 59 to 57, for example. We specify threshold levels in the ISM index. We then estimate a latent variable that has to cross these thresholds at the same time as the ISM index. If cross-category variance in the ISM matters more than within-category variation, we should find that forecasts of the latent variable predict the categories better than a model that forecasts the ISM index directly, and that the latent variable helps forecast other macro variables better than the ISM index itself.

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ENR5

Contributed Session: Electricity Markets

Tuesday, 11:10am-12:10pm Room: Le Mistral

Chair: Jiri Svec
University of Sydney, Australia

Seasonal cycles in hourly data: the case of the electricity demand

Cristina Mazas, José Luis Gallego
Universidad de Cantabria, Spain

The multiplicative ARIMA model with multiple seasonal periods for modelling hourly data is extended to handle unit roots at individual frequencies. Moreover, several tests procedures to characterise the nature (stochastic or deterministic) of the underlying components are proposed. Finally, forecasting implications are also considered.

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Diagnostic Testing for Earnings Forecasting Engines in Deregulated Electricity Markets

Jiri Svec, Max Stevenson
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In deregulated markets, electricity retailers purchase wholesale electricity from the national market at a variable price and on-sell it to retail customers for a fixed price. Retailer's Earnings at Risk (EaR) is thus a product of two stochastic quantities: load and price. However, since the underlying joint distribution for load and price is unobservable EaR is best determined using a simulation engine. While there are many approaches which can be used to generate load and price forecasts for the purposes of computing EaR, currently there is no established means by which a simulation engine can be assessed and evaluated relative to historically observed data. Furthermore, there is no established approach for comparing alternative forecasting methodologies. This paper develops a comprehensive set of diagnostic tests for earnings simulation engines and applies these to several sets of forecasts generated by different engines. The diagnostic tests are applicable to any provided set of simulation paths for load and/or price, where accompanying historical data is also made available. The tests were developed such that one can write a routine capable of taking the simulation paths and historical data as an input, with a complete diagnostic report generated as the output. Forecast performance measures are specified such that it is possible to compare the relative performance of simulation engines which have been calibrated on the same historical data. Criteria that are assessed to determine the effectiveness of the forecasts include key statistical quantities such as moments and correlations which must be reflected by the simulations and the frequency at which they should be assessed e.g. annual, quarterly, etc. The rate of convergence for the statistics generated by each engine is also measured along with the analysis of spikes (frequency and location), and the implied term structure generated by the mean and volatility of the simulations.

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ICT2

Invited Session: Forecasting Methods

Tuesday, 11:10am-12:10pm Room: Les Courants

Chair: Aniruddha Banerjee
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Automatic Prediction and Model Selection using RETINA Winpack and RETINET

Massimiliano Marinucci
Universidad Complutense de Madrid and Millward Brown, Spain

This work is about Automatic Model building and Prediction procedures that are useful to approximate the expected conditional mean of a stationary target variable generated by an unknown data generating process. A new software implementation of the RETINA method (P¶erez-Amaral, Gallo & White 2003) called RETINA Win-pack is proposed. This software piece is designed for immediate use by non-specialist applied researchers. It reads data in the Excel format, allowing fast and easy data input. It has a simple extremely user-friendly Graphical User Interface of just one window frame. As an important advantage over the original RETINA method, it handles extreme observations and allows for distinctive treatment of categorical in-puts. The latter feature allows to build flexible functional forms that include specific constants and specific slopes in a similar way to an analysis of covariance setting but with the important advantage that automatic selection on the predictors is performed. RETINA Winpack delivers an informative output by summarizing out-of-sample predictive statistics of proposed specifications and allowing the user to easily compare among them. Using RETINA Winpack, we present an empirical application to Telecommunications demand using ¯rm-level data. RETINA Winpack is proven to be useful for model specification search among hundred of candidate inputs and for finding suitable approximations that behave well out-of-sample in comparison with alternative linear baseline models. Final models are delivered in an analytical form, and interestingly these suggest possible substitution patterns among telephone equipments that are used as inputs. With the aim of increasing the flexibility of the RETINA method in order to deal with non-linearities in the target variable, another automatic model building and prediction method called RETINET is presented. RETINET generalizes RETINA by expanding the functional approximating capabilities in a way which is similar to Artificial Neural Networks, but avoids some typical drawbacks related to their parameters estimation by using the modeling strategy proposed by White (2006). As an advantage over traditional ANN, RETINET's specifications retain, to some ex-tent, analytical interpretability. This facilitates easier dissemination of the model as well as exploration of the effects of various terms. Based on two different simulation examples the method provides favorable evidence with respect to the out-of-sample forecasting ability provided by both simpler and/or more complex modeling alternatives. RETINET balances between a) Flexibility b) Parsimony c) Reverse engineering ability, and d) Computational speed. The proposed method is inspired by a Specific to General philosophy, going from the simple to the sophisticatedly simple avoiding unnecessary complexity.

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Forecasting productivity growth resulting from international diffusion of ICT innovation – a dynamic CGE modelling approach

Wojtek Szewczyk
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Productivity growth is acknowledged as a critical factor for long term economic growth and development. Maintaining satisfactory productivity growth requires a constant supply of product and process innovations which in turn are an output of investment in research and development (R&D). R&D investment and resulting innovation, however, are not evenly distributed among countries - e.g. within APEC economies 85 percent of total R&D expenditure is shared between the USA and Japan, and 80 per cent of all applications for patents are shared between the USA, Japan and China. Innovation created in one country can, however, be transferred to other countries across national borders and thus enhance the productivity of economies which do not undertake significant R&D of their own. This paper models and forecasts the diffusion of Information and Communication Technology (ICT) innovation in the APEC region for 2007-2015. The study focuses on diffusion of new technology via international embodied spillovers, where innovative knowledge is embodied in the traded product. Forecasts are created along two scenarios: a baseline forecast and a policy/deviation forecast. The baseline is created by incorporating externally provided projections of key indicators, such as change in GDP, investment and labour force growth, into a dynamic CGE model thereby generating a disaggregated view (to the sectoral level) across the APEC economies for 2007-2015. Having identified the winners and the losers of the ICT diffusion process from the baseline forecast, in the policy/deviation forecast we examine how changes in variables that impact upon economies' absorptive capacities may alter the predicted pattern of diffusion of ICT innovation.

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Statistical Methods for Regulatory and Commercial Disputes in Telecommunications

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The application of sophisticated statistical and econometric techniques to resolve disputes in telecommunications (whether regulatory or commercial) is a relatively recent, but welcome, development. This paper discusses two such applications: (1) survival and hazard rate analysis to determine the risks of a form of commercial malpractice in telecommunications known as "slamming"; (2) count and ordered discrete response regression analysis to assist regulators in determining the level of fiber-based collocation that needs to occur in an incumbent telecommunications company's central offices to qualify as evidence of effective competition. In the US, the Telecommunications Act of 1996 permitted incumbent local exchange carriers (ILECs) — that provided only network connections and local services to their customers — to start offering long distance services for the first time in direct competition with interexchange carriers (IXCs) that had previously provided those services exclusively. Since IXCs had to use ILEC networks to reach customers of long distance services, the new rules created not only opportunities for long distance competition but also for conflict and unethical commercial practices. One such practice — of which ILECs were frequently accused — involved "slamming," allegedly used by ILECs that provided network connections to make unauthorized switches of IXCs' customers of long distance services to themselves. In one instance, the ILEC accused of slamming blamed third-party selling agents for being overzealous in the pursuit of sales commissions. Survival and hazard rate analysis was used to assess the risks of slamming being practiced successfully for different types of long distance service, different customer and demographic segments, and different types of selling agent. Those risks were found to vary considerably over class of service, customer type, and selling agent. Following the introduction of local exchange competition, ILECs also sought relaxation of several regulations that had traditionally limited their operations. The Federal Communications Commission (FCC) devised an impairment test that was supposed to reveal whether sufficient competition had developed in ILEC-served local exchange areas in order for those ILECs to qualify for regulatory relief. One specific indicator of sufficient competition — fiber-based collocation at ILEC central offices by new entrants — became widely accepted in principle, although not all parties agreed on just how much such collocation was needed to meet the impairment test. In one dispute between ILECs and their new competitors, count and ordered discrete response regression was used to provide support for the ILEC contention that the impairment test of sufficient competition could be met with far fewer
collocated business lines than the number claimed by the new entrants.

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COU1

Invited Session: Count Data

Tuesday, 11:10am-12:10pm Room: Sirocco

Chair: Ralph Snyder
Monash University, Australia

State Space Models for Counts Data

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Ralph Snyder, Adrian Beaumont
Monash University, Melbourne, Australia

Time series that involve (often small) counts rather than continuous data require models that explicitly recognize those features. We examine Poisson-based state space models for non-stationary series using both single and multiple sources of error. We also examine the theoretical foundations of Croston's method. The various approaches are examined empirically using demand data on over 2500 car parts. In the second part of the presentation, we consider monitoring schemes for heteroscedastic counts data and introduce a simple variation of standard control charts to accommodate the changes in distributional form from one period to the next.

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Identification, estimation and forecasting of integer autoregressive moving average

Maryam Mohammadipour
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John Boylan
Buckinghamshire New University, UK

Integer autoregressive moving average models are discussed in this paper. The second unconditional moment of the INARMA(p,q) process is obtained. It is also shown that the autocorrelation and partial autocorrelation functions of this process are similar to those of an ARMA(p,q) process, thereby allowing use of their estimates (sample autocorrelation and sample partial autocorrelation) in order to identify the appropriate model for a specific integer-valued time series. A modified conditional least squares procedure is suggested to remove the mean estimate's bias when using these models in forecasting intermittent demand, immediately after a demand occurrence. Finally, the result of forecasting over a lead time for an INARMA(p,q) process is provided.

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The forecasting performance of stationary Poisson models

Ralph Snyder
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William Dunsmuir
University of New South Wales, Australia

Now that we live in an age where data are systematically collected in quite disaggregated form, one of the major challenges left in the theory of forecasting is to design methods for low count, over-dispersed time series. In this presentation we will review common methods of forecasting based on Poisson measurements with random means for stationary count time series and compare their performance on a database of car parts sales. It will be shown, for such data, that better forecasts may be obtained using methods designed for non-stationary time series.

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EXS2

Contributed Session: Exponential Smoothing II

Tuesday, 11:10am-12:10pm Room: Azur

Chair: Eddie McKenzie
University of Strathclyde, Glasgow, UK

Curvilinear Exponential Smoothing

Antonio J. Rodrigues
Universidade de Lisboa, Portugal

Curvilinear trends with non-periodic, quasi-periodic, or cyclical variations in convexity are quite common, and the damped trend exponential smoothing methods are not able to track and forecast such variations adequately. For that reason, we present a relatively simple new method, Curvilinear Exponential Smoothing (CES), that extends Holt's method with the introduction of a curvature parameter, to be recursively estimated along with the usual level and slope parameters, and that can also be further extended to accommodate seasonal effects, either multiplicative or additive ones. One useful application of the proposed methods is in combination with growth curves, or diffusion models, so to obtain improved forecasts in the short and long range, simultaneously. In the paper, we include some analytical results, several illustrative examples with time series from different sources and with different characteristics, and some preliminary comparative experimental results.

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Extending the Information Used by Method Selection Techniques II

Richard Lawton
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This paper continues the search for additional information on which to base method selection techniques in exponential smoothing. The earlier work was presented at ISF 2007 in New York. One of the most common approaches is to use one of the information criteria, there are several of these including the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The common feature of these is that they select a model based on a goodness of fit measure, along with a penalty function based on the number of parameters used. The goodness of fit measure used is based on the mean of the squares of errors, which are taken as one step ahead forecast errors. This seems to lose potentially useful information in that, whilst a method may manage to keep up with the level of a series, the nature of the forecast function is often the clearest factor which differentiates between the possible different methods. This paper therefore investigates the benefit of including such information into the selection process. It does so by using a different approach to that used last year. Here the approach is to look for patterns in the errors in the forecasts over a number of time horizons. The rationale for this is clear: if there is a trend in the data but this is being modelled using the wrong form of trend then this should be reflected in the errors. Correlations and autocorrelations in the errors are used to identify these patterns. In this paper these are applied to the main non-seasonal exponential smoothing methods, namely simple exponential smoothing, damped Holt's method and Holt's method.

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Why Damped Trend Exponential Smoothing works

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Everette S. Gardner, Jr.
University of Houston, USA

Damped-trend exponential smoothing has performed well in empirical research, including the M-competitions and a number of other studies in forecasting a wide variety of types of data including retail sales, inventory demands, computer parts, process industry sales and airline passenger numbers. In a practical sense, the reason for the success of damped trend forecasts is clear. As noted originally, the practice of projecting a straight line trend indefinitely into the future is simply far too optimistic (or pessimistic), and subsequent empirical studies tend to confirm that this is so in general. This pragmatic view may be intuitively appealing, but it leaves unanswered many questions about what is truly happening in the time series being forecast that makes trend-damping successful. One approach is to examine the models used in linear trend forecasting, and try to derive one which has intuitive appeal and for which trend-damping is actually optimal in some sense. Since the damped trend approach is not optimal for the commonest linear trend models, it is natural to inquire what an appropriate model should be. This is not a theoretical question, but an extremely practical one. If the damped trend approach yields the best forecasts in many situations then the models which would require that approach may be the best models of the underlying process in those cases. They are clearly not the standard models in common use. We present here one particular form of the linear model which we feel captures the likely behaviour which we associate with typical trending time series, and for which damped-trend exponential smoothing is optimal. Interestingly, it provides us with an interpretation that essentially reverses our original thinking on the use of damped-trend forecasting.

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FS2

Featured Session

Tuesday 12:20pm-01:15pm Room: Baie des Anges

Chair: Towhidul Islam
University of Guelph, Ontario, Canada

International diffusion of renewable energy and micro-generation technologies

Nigel Meade
Imperial College, London, UK

Internationally the provision of electrical power is currently dominated by fossil fuels: coal, oil and gas. As the costs of oil and gas increase and become increasingly volatile they become less attractive as the major energy source for a country. The carbon emissions of fossil fuels exert extra pressure to adopt power generation by alternative technologies. Here we will study the diffusion of renewable energy technologies as a means of electricity generation. In contrast to most industrial technological innovations there is not a straightforward economic advantage flowing from the new technology. Generation of electricity by a renewable energy technology is generally more expensive and less convenient than the current technology. The advantages of renewable energy technologies are reduced carbon emissions and reduced usage of fossil fuels. This means that the diffusion of the technology is intimately linked with how the environmental benefits of renewable energy technologies are priced in order to bestow an economic benefit on the adopter. Here we intend to study two aspects of the retreat from the use of fossil fuel for electricity generation. These are: (a) the increasing use of renewable energy resources for power generation by electricity suppliers and (b) the use of micro-generation technologies by individual households. Although similar stimuli drive the increasing usage of both these groups of technologies, the decision processes are very different. The change in usage of renewable energy resources by an electricity supplier is a response to a range of different stimuli, possibly different disincentives as well as geographic and economic factors. The effect of the decision will represent a significant proportion of the nation's electricity supply. The decision of a householder to install a micro-generator, such as a windmill or a solar panel will be driven by a desire to be green, by socio – economic and cultural factors, governmental incentive schemes, cost and benefit issues. In this case, one householder's decision has an imperceptible effect on the nation's demand for electricity. These two 'diffusion' processes offer different forecasting challenges. The diffusion of renewable technology in electricity generation, process (a), has some data available and will be modelled using a multi-country Bass type model. The diffusion of domestic micro-generation has barely started and we will use cross-sectional choice data to develop a basis for a forecast.

Nigel Meade has a BSc in Mathematics and Statistics and an MSc in Statistics from the University of Sheffield and a PhD in Management Science from Imperial College. He joined the faculty of Imperial College in 1973.
His academic interests can be summarised as statistical model building. Within this heading, his main interests are: time series analysis and forecasting with applications in finance, operations management and innovation diffusion; portfolio selection, index tracking and measurement of fund performance. He is associate editor of the International Journal of Forecasting and the European Journal of Finance. Until 2006, he was a director of the International Institute of Forecasters. He first attended an ISF in London In 1984 and has only missed three since then.

EBC7

Contributed Session: Nowcasting

Tuesday, 12:20pm-01:15pm Room: Clipper

Chair: Domenico Giannone
European Central Bank, Frankfurt am Main, Germany

Nowcasting Norwegian GDP: The Role of Asset Prices in a Small Open Economy

Knut Are Aastveit
University of Oslo and Central Bank of Norway, Oslo, Norway

Torres Trovik
Central Bank of Norway, Oslo, Norway

This paper finds that asset prices on Oslo Stock Exchange is the single most important block of data to improve estimates of current quarter GDP in Norway. Other important blocks of data are labor market data and industrial production indicators. We use an approximate dynamic factor model that is able to handle new information as it is released, thus the marginal impact on mean square nowcasting error can be studied for a large number of variables. We use a panel of 148 non-synchronous variables covering a broad spectrum of the Norwegian economy. The strong impact from financial data is due to an ability of the market clearing process to impart information about the real activity in Norway in a timely manner.

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The daily evolution of GDP nowcast in real time

Joelle Liebermann
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Giannone, Reichlin and Small (2007) developed a factor model framework for timely real-time nowcasting of GDP. Their method allows to exploit the information on the numerous monthly variables which are released on different dates and with varying degrees of delays and to update the nowcast in the current quarter each time new information is released. Using a panel of 200 US variables they perform a simulated pseudo out of sample exercise. They aggregate the variables in a stylized calendar of 15 releases and construct vintages by replicating the pattern of data availability implied by their stylized calendar. They find that their nowcasts are accurate relative to professional forecasters and that the precision of the nowcasts improves as new data releases are incorporated in the model. Their exercise is pseudo real-time as it is based on a stylized, i.e. constant, calendar for every month and on revised data vintages. In this paper we use Giannone et al. (2007) model to produce fully real-time nowcasts of US GDP. We have constructed vintages from September 2000 to January 2008, and are able to reproduce the exact information available to a forecaster at any given date in that range, timing and preliminary nature of the data, for a panel of 75 monthly variables. This issue of nowcasting in a fully real-time setting using many predictors has not yet been addressed. We evaluate the daily evolution in the current quarter of the nowcasts as more information is released and assess which macroeconomic releases have the most predictive content in real-time for nowcasting GDP. Results confirm that the model based early estimates of GDP growth based on many indicators are accurate at nowcasting. We also construct similar measures of news for inflation and assess bond yields reactions to these GDP and inflation news measures.

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Nowcasting real economic activity

Domenico Giannone
European Central Bank, Frankfurt am Main, Germany

Monetary policy decisions in real time are based on assessments of current and future economic conditions using incomplete data. Because most data are released with a lag and are subsequently revised, both forecasting and assessing current quarter conditions (nowcasting) are important tasks for central banks. Central banks (and markets) pay particular attention to selected data releases either because the data are released early relative to other variables or because they are directly tied to a variable the central banks want to forecast (e.g. employment or industrial production for nowcasting GDP). In principle, however, any release, no matter at what frequency, may potentially affect current-quarter estimates and their precision. From the point of view of the short-term forecaster, there is no reason to throw away any information, but it is of course relevant to understand how reliable each release is as a signal of current economic conditions. I describe methods for real-time now/forecasting and address several key issues that arise when using a large number of data series that are released at alternative times and with different lags. Particular attention will be devoted to the model developed by Giannone, Reichlin and Small (2008) which is currently implemented in many institutions including the Board of Governors of the Federal Reserve System, the European Central Bank, the Reserve Bank of New Zealand, the Norges Bank and the Hong Kong Monetary Authority. The method allows to track the real-time flow of the type of information monitored by central banks because it can handle large data sets with staggered data-release dates. Each time new data are released, the nowcasts are updated on the basis of progressively larger data sets that, reflecting the unsynchronized data-release dates, have a "jagged edge" across the most recent months. I will describe the performances of the models and the evaluation of the marginal impact that intra-monthly data releases have on current-quarter forecasts (nowcasts) of real GDP growth for the United States, the Euro Area and China.

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CLI3

Invited Session: Climate Forecasting: What is required for Scientific Modelling and Forecasting of Climate Change

Tuesday, 12:20pm-01:20pm Room: Fregate

Chair: Peter Young
Lancaster University, UK

Benchmark Climate Forecasts and their Implications what is required for scientific forecasting of climate change?

Robert Fildes
Lancaster University, UK

There remain sceptics as to whether long-term global average temperatures will increase as confidently predicted by the Intergovernmental Panel on Climate Change (IPCC). Green and Armstrong (2007), for example, argue that there is no scientific basis for accepting such predictions from the IPCC. Fildes will first summarise the core characteristics of global climate models and his views contrasted with the IPCC as to how such models should be validated. As in most forecasting research a key element is the ability to beat suitably defined benchmarks. From an appraisal of various possible extrapolative benchmarks, the presentation concludes that despite the lack of rigour in the IPCC's forecasting approach, the forecasting evidence offers little relief. The implications of benchmark forecasting evidence are that potentially damaging increases in temperature should be planned for.

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Central England Temperature: Analysis and Forecasting

Antonio Garcia-Ferrer
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Peter Young
Lancaster University, UK

Any evaluation of climate change in relation to climate change mitigation and management must involve the careful analysis and forecasting of long term climate records. In this paper, we consider one of the longest, continuous time series available: the well known Central England Temperature (CET) series that were compiled initially (from 1659 to 1973) by Professor Gordon Manley of Lancaster University, and later extended to the present by the UK Meteorological Office. In addition to modeling and forecasting, our analysis includes and evaluation of the changing characteristics of the annual cycle, including estimation of the changes in the phase of the annual cycle that reveal the phase change in 1752 arising from a change to the Gregorian from the Julian calendar, as pointed out originally by D. G. Thompson (1995). In a climate policy context, we also introduce a new Bayesian approach to multiple turning point estimation, where the derivative of an integrated Random Walk (IRW) model of the underlying trend in the data, as produced by the Dynamic Harmonic Regression (DHR) model, is used to date the number of temperature cycles as well as their duration.

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Modeling and Forecasting Climate Change

Peter Young
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The paper will consider the differences between hypothetico-deductive and inductive modeling, as they relate to research on climate change. It will outline the Data-Based Mechanistic (DBM) approach to modeling that tries to meld together the best aspects of these two modeling philosophies in order to develop a unified approach that combines the hypothetico-deductive virtues of good scientific intuition and simulation modeling with the pragmatism of inductive data-based modeling, where more objective inference from data is the primary driving force. In particular, it outlines a new method of complex simulation model emulation, in which the methodological tools of DBM modeling are used to develop a reduced order model that represents the `dominant modes' of the complex simulation model. In this form, the `dynamic emulation' model can be compared with the DBM model obtained directly from the analysis of real data and the tensions between the two modeling approaches may be relaxed to produce more computationally efficient models that are suitable for data assimilation, forecasting and emission control studies.

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FIN11

Invited Session: Forecasting Financial Risk

Tuesday, 12:20pm-01:20pm Room: Le Gallion

Chair: Ana-Maria Fuertes
Cass Business School, London, UK

Daily volatility forecasts: Can the GARCH(1,1) model be beaten using high-frequency data

Alan Speight
Swansea University, UK

David McMillan
University of St Andrews, UK

Volatility forecasting remains an ongoing area of research with no consensus as to the model that obtains the most accurate forecasts. Recently, Hansen and Lunde (2005) argued that in the context of exchange rate returns then nothing can beat a GARCH(1,1). This paper seeks to extend that line of research by utilising intra-day data and obtaining daily volatility forecasts from a range of models based upon the higher-frequency data. We consider as baseline models a daily GARCH(1,1) and a five-minute GARCH(1,1) and compare these to a range of models that utilise standardised intra-day data. The obtained volatility forecasts are compared using four different measures of 'true' volatility evaluated using both original and log versions of the Mincer-Zarnowitz regression and forecast encompassing regressions. Our results show that the daily GARCH(1,1) model is largely inferior to all other models, whereas the intra-day unadjusted GARCH(1,1) model largely provides superior forecasts compared to all other models. The only noticeable exception to this last statement is that the intra-day standardised data FIGARCH model appears to perform as well on certain measures of 'true' volatility. Hence, whilst is it appears that a daily GARCH(1,1) model can be beaten in obtaining accurate daily volatility forecasts, an intra-day GARCH(1,1) model may not be.

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Modeling and forecasting volatility in the UK natural gas futures markets

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Sjur Westgaard
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Joseph Onochie
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Merrill Heddy
Taylor Hedge Funds Research

Deregulation of many energy markets around the world has created the need for proper identification, definition, measurement, and management of risk in these markets. In 2007, over 45% of electricity production in the United Kingdom used natural gas as an input. As domestic production declined relative to growth of demand, the importance of natural gas to the U.K. economy has greatly increased. Analyzing fluctuations in the UK natural gas futures market is therefore of interest to energy companies, financial institutions investing in the market, and to the general public. Forecasting volatility is important for assessing market risk, energy costs, inflationary pressures, and consumer confidence, among other things. Recent fluctuations in UK natural gas futures market volatility have posed a challenge to those who would model and forecast it. We endeavor to identify the optimal model for forecasting volatility in the UK natural gas futures positions. By examining a variety of ARCH, GARCH, EGARCH, GJR-GARCH, APGARCH, IGARCH, and RiskMetrics models for daily log-returns, we apply BFGS and simulated annealing algorithms. We examine the association of previous futures positions on later futures positions in modeling and forecasting volatility of these contracts. As part of this analysis, we examine the impact of the volatility on the mean equation. Where the normality assumption is violated, we diagnose residuals and use alternative distributions, such as the Student t, G.E.D, and skewed-Student t, and model events significantly impacting volatility. From our application of out-of-sample forecast evaluation criteria over a one-day, one-week, two-week, three-week, and one-month horizons, we recommend an optimal GARCH model for forecasting UK natural gas futures volatility.

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Forecasting daily stock volatility: The role of intraday information and market conditions

Ana-Maria Fuertes, Elena Kalotychou
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Marwan Izzeldin
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Several recent studies advocate the use of nonparametric estimators of daily price variability that exploit intraday information. This paper compares four such estimators, realised volatility, realised range, realised power variation and realised bipower variation, both by examining their in-sample distributional properties and by ranking them from an out-of-sample forecast viewpoint when the object of interest is the usual conditional variance. The analysis is based on a 7-year sample of transaction prices for 14 stocks traded on the NYSE. The forecast race is conducted in a GARCH framework and relies on several (a)symmetric loss functions. The realized range fares relatively well in the in-sample fit analysis, for instance, regarding the extent by which it brings normality in returns. However, overall the realised power variation provides the most accurate 1-day-ahead forecasts. Forecast combination of all four intraday measures produces the smallest forecast errors in about half of the sampled stocks. A market conditions analysis reveals that the additional use of intraday data on day t to forecast volatility on day t+1 is most advantageous when day t is a low volume or an up-market day. The results have implications for value-at-risk analysts.

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ENR12

Contributed Session: Energy II

Tuesday, 12:20pm-01:20pm Room: Le Mistral

Chair: Robert Samohyl
Universidade Fed. de Santa Catarina, Brazil

Comparison Of Fuzzy Time Series Based On Difference Parameters And Two-Factor Time-Variant Fuzzy Time Series Models For Aviation Fuel Production Forecasting

Kubilay Ecerkale
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Sakir Esnaf
Istanbul University, Turkey

Time series models have been utilized to make accurate predictions in production. This paper employs a 3 year period of aviation fuel production data of Turkey as experimental data set. To forecast the aviation fuel production amounts, fuzzy time series forecasting based on difference parameters and two-factor time-variant fuzzy time series models are used and the results have been compared in this study. Based on the comparison results in the case of aviation fuel production, we conclude that both of the fuzzy time series models have advantages and disadvantages in use.

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A Methodology to Enhance the Steel Demand Forecasting

Pablo Valledor Pellicer, Miguel Iglesias Escudero, Maria Teresa Rodriguez Montequin, Tatiana Manso Nuno
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Business competition among companies in the same sector leads to have an accurate knowledge of the customer's demand of their products. This allows taking advance of the market share in the short and long-term, and therefore saving costs and increasing the profits by modifying the sales and price policy. The demand of a product depends on several factors which difficult its prediction such as the geographic area involved, stocks level, imports or the price of the product. These factors affect the trend of the demand and have influence on the forecasting. In this paper a methodology to predict the steel demand is proposed. It takes into account factors that rise from the market and that have influence on the steel demand, and the historical data that represents the real market situation. Data mining techniques have been proved useful to analyze the relationship between macroeconomic variables and the steel demand. They allow identifying factors that have influence on the tendency of products demand and how they affect its evolution. As a result a statistical model that includes expert knowledge to improve the forecasting has been developed.

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Monitoring Forecast Errors with Combined CUSUM and Shewhart Control Charts

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The maintenance of ever smaller forecasting errors should be a constant concern in any organization where decision making entails uncertain knowledge of the future. The purpose of this paper is to present a monitoring technique for checking forecast errors constantly through time and alerting the forecaster to errors that are unusually large, either as individual values or accumulated sums of past errors. Errors considered too large in terms of objectively defined statistical conditions signal the necessity of an intervention in the forecasting process. Here we explore the possibility of applying Statistical Process Control to forecast errors for generating the intervention signal. A monitoring scheme is set up based on Shewhart-CUSUM control charts used simultaneously. The Shewhart control chart will signal the existence of large individual errors while the CUSUM chart allerts the forecaster to smaller but recurring errors. The process of monitoring errors should act as a learning experience for the forecaster, and consequently errors should diminish through time. An example is presented with recent data for residencial consumption of electrical energy in Southern Brazil.

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MTD8

Invited Session: Forecast Performance Measures

Tuesday, 12:20pm-01:20pm Room: Les Courants

Chair: Wilpen L. Gorr
Carnegie Mellon University, USA

Conservative and liberal error measures for evaluating the combination forecasts

Celal Aksu
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Şevket I. Günter
Bogazici University, Istanbul, Turkey

This paper considers certain correlationally valid error measures developed for the purpose of evaluating combination forecasts (referred to as "S-type" statistics) and analogous revisions of Theil's U2, GRMSE and GMRAE measures. We provide comparative static analyses of the properties of these measures with respect to scale-independence, sensitivity to small changes, selective sensitivity, conservatism, reliability, typicality and protection against outliers in the series and against outlier relative errors. Via simulations, the probability distributions of these new measures are derived under certain simplifying assumptions to study their stability, typicality, and conservatism. We provide arguments for why the S-type measures should be preferred for evaluating combination forecast errors.

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Reanalyzing M1 and M3 Competition Data Using Receiver Operating Characteristic Curves

Matthew J. Schneider, Wilpen L. Gorr
Carnegie Mellon University, USA

This paper reanalyzes monthly, micro-scale M1 and M3 competition data using the receiver operating characteristic (ROC) framework. A major finding of the M-competitions is that simple forecast methods are as accurate or more so than complex ones. All of previous M-competition research, however, has focused on forecast accuracy measures that place much weight on central tenancy, or "business as usual." An important additional need is forecasts of exceptional conditions, characterized by large forecasted changes in demand from current demand levels. The ROC framework evaluates forecasts for such conditions. We chose monthly micro data as best representing the forecast needs of product manufacturers and service providers. We also limit attention to one-month-ahead forecasts as being the most important and only forecast horizon that can be forecasted more accurately than the random walk. There are surprising results, somewhat contradicting past analyses of M-competition data: Certain complex methods such as the Automated Neural Network and Smart FCS are among the top performers now. Forecast Pro and Theta, identified as top performers in previous work, are still top performers, but only over certain intervals of the relevant ranges. Many forecast methods are clearly and strongly dominated by the top performers. We conclude that the ROC framework leads to new insights into past and future forecast competitions for the important management requirement of forecasting large changes in demand.

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A Forecast Accuracy Measure for Exception Reporting Using Receiver Operating Characteristic Methodology

Wilpen L. Gorr
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This paper identifies exception reporting as a special need in forecasting, requiring new forecast accuracy measures and complex forecast models for success. Exception reports of expected large changes in demand, based on time series forecasts, allow managers to prevent losses or take advantage of opportunities that otherwise would be surprises without forecasting. In contrast, existing forecast accuracy measures (such as the RMSE, MAPE, and MASE) are for time series forecast methods aimed at "business-as-usual conditions", those with foreseeable changes such as from time trend and seasonality. The cumulative findings of the extensive literature for such accuracy measures is that simple univariate methods are as accurate or more so than complex or sophisticated models. For exception reporting, triggered by forecasted large changes in time trends, we introduce forecast accuracy measures based on receiver operating characteristic (ROC) methodology, which is used to assess diagnostic tests in many fields. We apply simple univariate time series methods and a causal distributed lag model in a case study on crime in small areas of two cities. The simple methods are by far the best forecasters for business-as-usual conditions, using traditional forecast accuracy measures; whereas, the causal model is by far the best forecaster for exception reporting, using the ROC forecast accuracy measures.

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CRI1

Contributed Session: Crime

Tuesday, 12:20pm-01:20pm Room: Sirocco

Chair: Joris van Velsen
Den Haag, The Netherlands

Homicide flash-ups prediction

Dmitry V. Serebryakov, Igor V. Kuznetsov, Sergey A. Naumenko
Moscow, Russia

This work represents a homicide flash-ups prediction algorithm specially detailed from general criminality prediction method developing over recent years, which based on universal behavior rules of complex nonlinear hierarchical systems. We study algorithm sensitivity to data variation over a huge number of algorithm prediction results obtained by variation of algorithm's parameters. We obtained interesting limitations: if one makes nontrivial prediction, more 50% of homicide flash-ups, the minimum alarm time percentage equals 20%, to predict more 70% of flash-ups we have to have more 60% of false alarm time. Using weekly criminality militia data from Yaroslavl and Tambov, two far-distant-enough administrative centers, we show that the developed algorithm represents similar satisfactory results over different time series and doesn't exhibit super-sensitivity to its parameters variation.

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Modelling recorded crime: a full search among cointegrated models

Joris van Velsen, Sunil Choenni
Den Haag, The Netherlands

The statistical relation between recorded crime and economic and demographic variables, such as unemployment and the number of young males, is not only of fundamental importance, but also becomes increasingly important in forecasting tools for policy and planning decisions. As recorded crime and its predictor variables are generally integrated of order one, two kinds of models exist. There are short-run models specified in first differences and cointegrated models specified in levels. Cointegrated models are to be favored when making long term forecasts. Empirically, given a set of predictor variables, a times series analysis indicates whether a cointegrated model is supported by the data or not. In this work, we go beyond a time series analysis for a fixed set of predictor variables. Rather, we consider all subsets of a set of potential predictor variables and search for cointegrated models. A manual inspection of all subsets is not feasible because the number of subsets, and thereby the number of candidate models, grows exponentially with the number of potential predictor variables. To investigate the candidate models, we developed a model generator that automatically builds and estimates them and subsequently checks for cointegration. The cointegration check consists of the first step of the Engle-Granger procedure. The generator discards models that are not cointegrated and then estimates the cointegrated models using NLS regression. Finally, the generator orders the cointegrated models using the information criterions AIC and BIC. This yields a robuust cointegrated model and an in-sample forecast reveals that it outperforms short-run models in the long run.

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SCH1

Contributed Session: Supply Chain

Tuesday, 12:20pm-01:20pm Room: Azur

Chair: Aris Syntetos
University of Salford, UK

Designing FSS for the supply chain: Through action-oriented user interfaces

Stavros Asimakopoulos, Robert Fildes
Lancaster University Management School, UK

Alan Dix
Lancaster University, UK

Based on interview and observational data gathered from professional designers and users working in supply chain forecasting, we show that combining action based product knowledge with historical data can be usefully incorporated in an effective FSS user interface. The presentation describes a theoretical framework depicting various motives behind the use of FSS: the need for balanced visualization of data and product knowledge, and attention to product behavioural essentials. Moreover, user interfaces should support negotiation and informal communication aspects that are generated through forecast reports and review meetings, while eliminating the organizational politics often found in supply chain forecasting. The theoretical framework emphasizes also the need to merge reasonable forecasts and action-oriented user interfaces. Based on the proposed theoretical framework, it is possible to outline five broad support areas for the design of FSS user interfaces. These are the following: (1) the special features of specific products (2) support for product knowledge generated from informal communications during the forecasting process (3) the provision of features that enable dynamic interchange of historical data and product knowledge (4) an area where users can annotate and negotiate elements of forecasting (5) an enhanced interface incorporating navigational cues embodying organizational knowledge. Indeed, these novel human-system interactions challenge the notion that FSS should serve the production and objectification of accurate forecasts. In contrast, this study promotes to approach to the design of FSS as actionable and knowledge rich resources that address temporal organizational arrangements.

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Judgmental changes to retail sales forecasts and automatic orders

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University of Salford, UK

John E. Boylan
Buckinghamshire New University, UK

Retailers introducing forecast-based automatic replenishment (Computer Generated Orders, CGO) systems usually allow store managers to change forecasts or orders. The justification is that long experience in retail logistics and sales patterns allows humans to improve on automatic forecasts or orders. We present analyses of such manual changes from recent introductions of CGO systems. The main finding is that judgmental changes may drastically increase inventories without appreciably reducing out-of-stocks. However, the number of manual changes decreases over time as personnel come to trust the system. Worse orders may be a price we need to pay in the change process of a CGO introduction in order to win users' trust.
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On the statistical properties of judgemental forecasts

Aris Syntetos
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John. E. Boylan
Buckinghamshire New University, UK

Stephen M. Disney
Cardiff Business School, Wales UK

Empirical research suggests that quantitatively derived forecasts are very frequently judgementally adjusted. Nevertheless, very little work has been conducted to evaluate the performance of these judgemental adjustments in terms of their statistical properties and the corresponding forecasting and stock control implications. Our work analyses monthly demand forecasts for the UK branch of a major international pharmaceutical company. The company relies upon a commercially available statistical forecasting system to produce forecasts that are subsequently judgementally adjusted based on marketing intelligence gathered by the company forecasters. The benefits of the intervention are evaluated allowing insights to be gained on potential improvements to the demand forecasting processes.

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FS3

Plenary Session

Tuesday 2:20pm-3:15pm Room: Baie des Anges

Chair: Paul Goodwin
University of Bath, Bath, England

Dance with Chance: Harnessing the Power of Luck

Spyros Makridakis
INSEAD, Fontainebleau, France

Robin M. Hogarth
Universitat Pompeu Fabra Barcelona, Spain

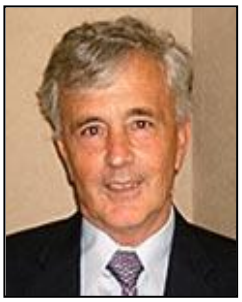
All future-oriented human activities require predictions. And yet, the environment in which we live varies incredibly in terms of what is and what is not predictable. At one extreme, science has taught us how to predict certain events with stunning accuracy (e.g., the timing of tides, sunset, or sunrise). At he same time, there are many important events that defy accurate prediction – the timing and location of natural disasters like earthquakes, the next financial crisis, the level of the stock markets or exchange rates in a year's time, when and where Al Qaeda will next strike, and so on.

That there are limits to what we can predict implies that many important decisions must be made under conditions of uncertainty. Thus, decision makers cannot control what happens since chance – or the occurrence of innumerable, unidentifiable factors – plays a critical role in what happens. However, since people are motivated to control what happens, the intervention of chance – or luck – can often be a source of considerable anxiety and stress. Moreover, how people cope with such anxiety is critical to their success.

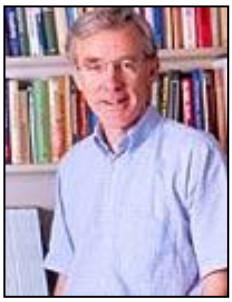
The simplest way is to ignore the role of chance. Indeed, given the prevalence of superstition in society, this method has long historical antecedents. A closely related and common tactic involves downplaying the role of chance by imagining that one has more control over uncertain outcomes than is in fact the case. This is called the "illusion of control" and has the advantage that one can take credit for events that happen to turn out favorably while blaming bad luck or someone else when things go wrong.

In this talk, we argue that ignorance of the limits of predictability induces people to fall victim to the illusion of control in practically all important areas of their lives and careers. This, in turn, implies many bad decisions. However, by accepting the limits to predictability and thereby abandoning illusions of control, we can – paradoxically – gain more control over what happens.

In the beginning of our talk we will ask you to tell us what is most important to you and how much control you feel you have in these domains. Consequently, we will show you that your responses indicate considerable illusions of control in the domains you identified as being the most important to you. We then consider the implications involved and provide suggestions that will enable you to profit from important decisions concerning your life and future success.



Spyros Makridakis: Following the attainment of a place in the Greek Sailing Team in the Olympics of 1960, Spyros Makridakis set sail for New York University where he obtained a PhD in 1969. Since then he has advised numerous international organizations and government agencies and consulted worldwide. Spyros has held teaching and research positions with several European and American institutions; as a research fellow with IIM Berlin, an ICAME fellow at Stanford University and a visiting scholar at MIT and Harvard. He is now a Research Professor at INSEAD that he joined in 1970. In addition to teaching and consulting expertise, he has also authored, or co-authored, twenty books including *Forecasting, Planning and Strategy for the 21st Century* (The Free Press) and *Forecasting Methods for Management* (Wiley) which reached its 5th edition and sold more than 120,000 copies in twelve languages. He has also published more than 120 articles and book chapters. He was the founding chief editor of the *Journal of Forecasting* and the *International Journal of Forecasting.* Furthermore, he has won twice the "Best Teacher Award" at INSEAD. In 1998-1999 Spyros was the Chairman of the Board of TelePassport Hellas, a telecom firm, and from the beginning of 2000 until the middle of 2004 was the Chairman of the Board of Lamda Development, a holding company. Since then he is the Chairman of the Board of PrivatSea, a Latsis Group company dealing with mega-yachts.



Robin M. Hogarth is ICREA Research Professor at Universitat Pompeu Fabra, Barcelona. He was formerly the Wallace W. Booth Professor of Behavioral Science at the University of Chicago's Graduate School of Business where he served as Deputy Dean from 1993 to 1998. Hogarth was a member of the Chicago faculty from 1979 to 2001 prior to which he held appointments at INSEAD in France and the London Business School. He earned his MBA from INSEAD (1968) and his Ph.D. from the University of Chicago (1972). His research has focused mainly on the psychology of judgment and decision making and he has published several books (including *Judgement and Choice*, Wiley, 2nd ed., 1987) and many articles in leading professional journals (e.g., *Psychological Bulletin, Psychological Review, Management Science, Journal of the American Statistical Association, Journal of Risk and Uncertainty*). He is a past President of the Society for Judgment and Decision Making and President-elect of the European Association for Decision Making. His most recent book, *Educating Intuition*, was published by the University of Chicago Press in 2001. In June 2007, Hogarth was awarded the degree of "doctor honoris causa" by the University of Lausanne.

NN4

Invited Session: Neural Networks Forecasting Competition

Tuesday, 03:25pm-04:45pm Room: Baie des Anges

Chair: Sven Crone
Lancaster Centre for Forecasting, UK

A dynamic fuzzy model applied for time series prediction at the NN5

Ivette Luna, Secundino Soares
DENSIS - FEEC – UNICAMP, Brasil

Rosangela Ballini
Instituto de Economia, Brasil

This paper presents an adaptive time series model based on Takagi-Sugeno fuzzy systems which is built in two phases. The first phase uses an offline clustering algorithm to determine initial group structures in a reduced data set. This stage is necessary in order to obtain an initial number of fuzzy rules that will compose the model structure. Indeed, the model initialization will guarantee that the second stage starts the learning process from a local optimal solution. During the second phase, the model is modified dynamically via adding and pruning operators and a recursive learning algorithm, which is based on the Expectation Maximization optimization technique. This sequential algorithm determines automatically the number of fuzzy rules necessary at each time instant, whereas predictions are estimated. Thus, the model structure and parameters are updated simultaneously. The main advantage of the model proposed is that it does not require a re-training of the model with all the dataset available for its adjustment, every time new data on the historical of the time series is increased, which is a great advantage in terms of time process and computational effort. The proposal is applied for forecasting the complete dataset of daily cash money demand at the NN5 competition. After data pre-processing and input selection, the first 679 values of each time series were used for models adjustment. The last 56 values of historical data were used for evaluating the models from one step ahead to 56 steps ahead. Initial results show that the model acquires a mean SMAPE (symmetric mean absolute percentage error) of approximately 18.72% with a standard deviation of 5.53% for the complete dataset and a mean SMAPE of 18.88% with a standard deviation of 7.01% for the reduced dataset of the competition.

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Forecasting daily withdrawals at cash machines with Markov-switching models

Adam R. Brentnall, Martin J. Crowder, David J. Hand
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The development of a system to predict the daily amounts withdrawn from a portfolio of 111 automated teller machines (ATMs) is considered. The data are from the NN5 Neural Networks Forecasting Competition. An important mechanism affecting these data is that on certain days an ATM may be out of service, but this information is not directly available. We use a Markov-switching model to capture movement between normal and out-of-service days as a hidden Markov chain, and allow for autocorrelation in daily withdrawal amounts. A feature of the model is that demand for cash may be separated from out-of-service effects. Several plausible versions of the model are developed to incorporate aspects such as seasonality that have been identified from a data analysis. Point forecasts are median predictions, and the Mean Absolute Percentage Error (MAPE) is used as the fitting criterion. The choice of Markov-switching model for each ATM is based on the MAPE of an out-of-sample test set.

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Application of Belief Rule Base Inference System for Time Series Forecasting

Jun Liu
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Luis Martinez-Lopez
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Jian-B Yang
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A belief Rule-base Inference Methodology using the Evidential Reasoning approach (RIMER) has been developed recently [1], and the optimal learning methods for training the belief rule base have been proposed in [2], which has been successfuly used in pipeline leak detection [3]. The belief rule based system has shown to be able to enhance conventional rule-based system and are capable of representing more complicated causal relationships using different types of information with uncertainties, which differentiate from conventional ones with some unique features: it can explicitly model and infer with ignorance (incompleteness) that may exist either inside the rules or in the input data; as well as accommodate hybrid input and output information under uncertainties (numerical or judgmental or both). This paper describes how the belief rule based systems and its optimally learning scheme can be applied for time series forecasting. The process and the outcomes of applying the belief rule based inference methodology and its learning algorithm for a forecasting problem and its relevant data set provided in NN5 Competition are described. This study will demonstrate if the belief rule based system can make the accurate forecasting through this real problem, including its feasibility, applicability and validity.

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Forecasting via parallel coestimatiom of time series

Veska Noncheva, Bono Nonchev, Vasil Nonchev
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The NN5 Time Series Forecasting Competition involves forecasting a large number of time series with different features such as seasonality, trend, missing values and outliers. In this paper a supervised learning method choosing the NN5 forecasting strategy effectively is presented. This method works under the assumptions listed below. When one or more observations are missing, the model describing data is estimated and estimates of the missing values are obtained. By including estimates of missing values, a better understanding of the nature of the data is possible with more accurate forecasting. Different time series may require different strategies to estimate these missing values. The data series consist of several agglutinate time series. That is, no single model building strategy would work well for all time series. Obviously the data can rarely, if ever, be described by a simple mathematical model. Nor is the measurement of error in terms of mean squared error necessarily always the most appropriate one, in spite of its mathematical convenience. Because of it we investigate simultaneously a couple of time series - the original and an artificial concomitant - build by means of error measuring indicators. In order to obtain the best possible estimates and the most accurate prediction, the forecast method is extracted from both the observed data, and the error measuring data. When the concomitant series shows significant errors, we change the model with a new one.

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EBC1

Contributed Session: Economic Cycles

Tuesday, 03:25pm-04:45pm Room: Clipper

Chair: Anirvan Banerji
ECRI, New York, USA

Is expected production a reliable leading indicator when it is disconnected from the general view about the sector? A threshold analysis in the French manufacturing industry

Marie Bessec, Otman Bouabdallah
DGTPE, Paris, France

In business tendency surveys conducted by the French statistical institute, INSEE, industry leaders provide their expectations about the production of their own firms as well as about the activity of the entire sector. The first set of expectations is commonly used by practitioners to predict the activity growth at short horizons. Over the last semester, the sampled leaders were very pessimistic about the prospect of the sector, even though they remained confident about their own production. The purpose of this paper is to assess the reliability of the personal expectations for prediction when there is a gap with the general view about the sector. To this aim, we use a three-regime threshold specification. In this model, the link between the production growth and the personal expectations can vary according to the difference between the two survey variables. The results show that the personal expectations lose their predictive power when they are not consistent with the general expectations. The comparison of the regime shifts to the business cycle turning points shows that the extreme regimes are visited both during the acceleration and the slowdown periods of activity. These results should lead practitioners to exercise caution when using these survey variables for prediction.

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Forecasting of turning points in the Italian production indexes

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In this paper we try to bridge together two different econometric methodologies, dynamic factor models and Logit model, to predict turning points for Italian general index of production (hereafter IPI). First, using the dynamic factor models proposed by Forni et al. (2000) we classify the disaggregated series (at three digit of NACE economic classification) of IPI as being leading, coincident or lagging according to their phase delay. This represents an important preliminary analysis that requires accurate data transformation of the original series together with a study for the classification of the variables. Second, according to precedent studies (see for example Estrella e Mishkin (1998)), this information is included as independent variable in a Logit model where the dependent variable takes only two possible values depending on whether the economy is or is not in recession. We compare the proposed approach with a more consolidated business cycle dating method based on Markov switching model

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Detecting economic regimes in France: A Markov-switching method and a parameterized pattern

Frédéric Tallet, José Bardaji
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Hamilton (1989, 1990) was one of the pioneers in implementing hidden Markov models in order to detect parametrically the business cycle in USA through the Gross National Product (GNP). But GNP estimates can be revised and are available with delay. On the contrary, business survey data are almost not revised and available at the end of the month under review. These data giving an accurate information on the economic outlook have therefore been widely involved in recent indicators aiming at detecting economic regime changes. This work provides two indicators of the French economy regime changes based upon different Insee's business survey data. Our first Markov-switching turning point index deals with these heterogeneous data (difference of frequency, of time-span, etc). Inspired by the initial method proposed by Gregoir and Lenglart (2000), technical adaptations have been developed to tackle the difficulties stemming from different frequencies and time-span. A second turning point index predicting recessions is also provided based on a parameterized pattern recognition algorithm from Keilis-Borok (2000), previously applied to earthquake prediction.

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Can market-moving numbers predict economic cycle turning points better than stock prices themselves do?

Anirvan Banerji
ECRI, New York, USA

Every day, financial market participants, inundated by a proliferation of so-called "market-moving" economic numbers, attempt to ladder this information together in the hope of gauging the economy's direction with greater precision. Some of these statistics are considered important enough that financial news organizations explicitly monitor their consensus forecasts. We combined such key indicators into a Market Indicator Gauge (MIG), constructed as an equally weighted average of 35 normalized market-moving time series, and tested it to check whether it was a good leading indicator of U.S. economic growth. We found that the MIG does not exhibit much of a systematic lead at economic cycle turning points. A variant of the MIG in the form of a diffusion index of the 35 market-moving time series did not prove much better. Next, it is known that certain indicators derived from market prices can act as leading indicators of the economic cycle. We combined four such time series into a composite Market Based Leading Index (MBLI), and tested it for its ability to predict the direction of economic growth. Unfortunately, the MBLI's performance, while slightly superior to the MIG's in certain respects, was clearly worse in other respects, and, in fact, worse than the performance of stock prices as a leading indicator of the economy. Specifically, it appears that stock prices are superior to both the MIG and the MBLI in signaling upturns in economic growth, but the MBLI is particularly bad in promptly signaling downturns, where stock prices and the MIG are somewhat better, but not very good either. This still suggests that stock prices incorporate useful information beyond what is contained in widely followed economic releases.

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FIN9

Contributed Session: Finance III

Tuesday, 03:25pm-04:25pm Room: Fregate

Chair: Carole Toque
LSF-University of Luxembourg, Luxembourg

Kalman filtering as a performance monitoring technique for a propensity scorecard

Katarzyna Bijak
Warsaw, Poland

Propensity scorecards allow forecasting, which bank customers will soon be interested in new credits, through assessing their willingness to make application for new loans. Such scoring models are considered efficient tools to select customers for bank marketing campaigns. Kalman filtering can help monitoring scorecard performance. That technique is illustrated with an example of a propensity scorecard developed on the credit bureau data. Data coming from successive months are used to systematically update the baseline model. The updated scorecard is the output of the Kalman filter. As model parameters are estimated using commercial software dedicated to scorecard development, the estimator features are unknown. It is assumed that the estimator is unbiased and follows asymptotic normal distribution. The estimator variance is then derived from the bootstrap. The odds are defined as a measure of a customer's willingness to apply for new loans, calculated as a ratio of the willing to the unwilling among customers having a given score. Once the scorecard is developed, an auxiliary linear model is estimated to find a relationship between the score and the natural logarithm of the odds for that score. That relationship is then used to determine the customer's propensity level. Every month a new sample is scored with both the baseline and the updated scorecards. For each customer the log odds are estimated using the relationship between the baseline score and the willingness to apply for new loans. That estimate, which represents the customer's propensity level provided that the baseline scorecard is still up-to-date, is then compared with the estimate computed using the relationship between the updated score and the log odds. The example demonstrates that a scorecard may become less and less up-to-date although the commonly used performance measures such as the Gini coefficient or the Kolmogorov-Smirnov statistic do not change considerably.

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Forecasting the Value Effect of Seasoned Equity Offering Announcements

Konstantinos Bozos
Leeds University Business School, Leeds, UK

Konstantinos Nikolopoulos
University of Peloponnese, Greece

Nikolaos Bougioukos
National Technical University of Athens, Athens, Greece;

This study examines alternative models for predicting abnormal security price reactions, namely the market value effect, to the announcement of Seasoned Equity Offers (SEOs). Equity offers aim to raise cash from capital markets through the issue of new stock, in order to finance investments and capital restructuring. Empirical research reveals that SEO announcements generally result in negative returns, since they are mostly perceived as a signal of overvalued share prices and information asymmetries between managers and investors. However, the existence of a number of positive returns, which is often observed, suggests that the negative signaling hypothesis fails to fully explain the phenomenon. In any case, being able to predict the exact SEO effect on the market value of a company is of great importance: for the issuer as to protect the shareholders from the price dilution, for the institutional investors as to proactively restructure their portfolios, for the individual investors as to ensure trading liquidity. Data have

been collected from 149 SEOs from the Athens Exchange (ATHEX) in Greece alongside with explanatory information including SEO size, use of proceeds, market performance, number of shares and industrial sector. A forecasting competition is conducted among econometric models, non-parametric regression smoothing approaches, Artificial Neural Networks, and expert judgment in order to estimate the sign and exact size of abnormal returns. These abnormalities can be controlled through counter-effect policies or capitalized via short term trading. Further discussion investigates the extent at which the underlying theory explains the observed phenomena.

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Idetifying and predicting financial distress

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Elaine Hutson
University College of Dublin, Ireland

Well-known biases associated with hedge fund data have created difficulties in analysing and predicting financial distress for individual funds. This study was interested in providing a clearer identification of the factors which influence financial distress in hedge funds, along with a probabilistic forecast of financial distress for individual hedge funds using a Cox Proportional Hazards (CPH) model with fixed covariates. Covariates included return measures, fund size, leverage, fee structure, domicile, strategy, liquidity, managerial discretion and minimum investment. Various filters that included examination of the probability distributions of both those funds found to fail and to survive, depletion of assets under management, as well as the average return of a fund throughout its lifetime and the last 12 and 24 months of its existence, were used as preliminary screening tools to detect financial distress and underperformance. By adopting a forecast evaluation procedure developed from the theory of signal detection, it we found that the specification of the CPH model incorporating fixed factors had predictive skill for detecting financial distress in individual hedge funds.

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Can the Ratings forecast fund's Performance?

Carole Toque, Virginie Terraza
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In this paper, an attempt is made to verify the relationship between funds performance and its ratings in accordance with two rating's methodology (Europerformance and Morningstar). The hypothesis is that an increase (a decrease) in funds' rating is associated in increase (a decrease) in funds' expected performance. This is the typical setup for active managers who are given the task of selecting appropriate funds. In this paper, we have focused on the development of different statistical methods which take into account the constraint of monthly ratings. Aggregation methods and simulated data using bootstrap techniques are estimated and compared at each stage of the analysis. Using non parametric correlation measures, we find evidence of a relationship between ratings and expected performance only in some cases. However, this result can be biased by uncomputed cross-correlations. Applying causality methods, we find strong evidence of feedback effects: We show that the europerformance ratings depend on one lagged returns positively or negatively and conversely. The same goes for general trends between the morningstar ratings and returns but with stronger coefficients. We observe that shock impacts affect the returns or the ratings immediately and that according to the series the shock disappears either after three months or at the end of six to eight months. Intensity is often more important when the shocks affect the returns. Further investigation of functional relations can be made in order to build a forecasting model.

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JUD2

Contributed Session: Judgmental and Scenario Forecasting II

Tuesday, 03:25pm-04:25pm Room: Le Gallion

Chair: Akrivi Litsa
National Technical University of Athens, Greece

Sequence Effects in Judgment-based Software Development Work-Effort Forecasting

Stein Grimstad, Magne Jørgensen
Simula Research Laboratory, Lysaker, Norway

Accurate forecasts of work-effort are essential to enable successful software development projects. Such forecasts are typically judgment-based and inaccurate. One important reason for the inaccuracy may be due to the "sequence effect", i.e., that initial software development work-effort forecasts may affect subsequent, even unrelated, judgment-based forecasting work. If, for example, the previously forecasted development task was small, there seems to be a tendency to under-estimate the work-effort of the following task. We report sequence effects found in the laboratory and in the field. In a laboratory-based experiment, we randomly divided 56 software professionals into two groups. One group started with work-effort forecasts of a small and the other of a larger software development task. Subsequently, all the software professionals were asked to forecast the work-effort of the same medium-sized task. We found that the forecasts of the medium-sized tasks were assimilated towards the initial forecasts, i.e., the group that initially forecasted a small task submitted, on average, lower forecasts of the medium-sized task than the group that initially forecasted a larger task. We found similar results in a field experiment. Forty software companies from Asia and Eastern Europe were hired to forecast the work-effort of the same five software development projects. The companies that started with forecasts of the largest projects submitted, on average, the highest forecasts of the other projects. The typical approach for software development work-effort forecasting is based on a decomposition of projects into sub-tasks. A possible consequence of our results is that software professionals should start with forecasts of medium complex, medium sized sub-tasks of the project, or, with large and complex task if there is a strong tendency towards over-optimistic forecasts.
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Forecasting the Economic Impact of New Environmental Policies via a Hybrid Approach Combining Structured Analogies and Econometric Modelling

Nicolas Savio, Konstantinos Nikolopoulos
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This research proposes a new method for forecasting the economic impact of environmental policies. When such policies are in the development phase, an important criterion for any Governmental organisation when deciding if they are to be implemented is the results of the 'impact assessment' (IA), in which the forecasting stage is a fundamental step. The aim of this research is to improve the ability to forecast the economic impact of new environmental policies and hence improve decision making for the relevant governance structures. The proposed area of research is a relatively new application of forecasting which has emerged with the recent rise in profile of environmental issues; a result of the intensification of the environmental movement and the push for sustainable development. Econometric models are useful in providing forecasts based on the past relations between economic variables. However, like any quantitative forecasting method, econometric models fail to predict unsystematic changes. What's more, this research recognizes the potential benefit of forecasting with analogies, particularly in the context of policy forecasting but is concerned with its biased nature. Consequently, this research proposes the use of Green and Armstrong (2007)'s structured analogy approach, which suggests a structured judgmental procedure such that the knowledge and expertise available from analogous cases can be extracted more efficiently, to overcome this issue. Hence, the method advanced by this research consists of a hybrid approach which incorporates expertise in the domain (through structured analogies) combined with (objective) econometric techniques. The key to approaching this problem is to treat a new environmental policy as a non-periodic special event and to try and estimate its economic impact via the use of similar, analogous events of the past.
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Individual and Collective Intuition in Managerial Forecasting: The Case of the Music Industry

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This paper examines the role of intuition in managerial forecasting, taking the case of the music industry. It distinguishes itself from prior research in three different ways: First, the study tests the predictive power of collective intuition, a notion that, to our knowledge, has not yet been subject to empirical investigation in the managerial decision-making literature. Second, we test previous findings regarding optimal degrees of intuitive and rational cognition in forecasting by comparing the performance of managers displaying various levels of domain-specific expertise. Third, the paper reports experimental field evidence from a high stake, highly uncertain industry context which has previously been neglected in decision research. The proposed method tests the boundaries of Blattberg and Hoch's (1990) earlier findings on combining database models with managerial intuition. Results indicate the superior value of collective intuition, which is suggested to be most effective if small teams of two to three experienced managers combine their expertise. A positive relationship is reported between levels of expertise and predictive power of intuition. The optimal contribution of rational and intuitive cognition was found to stabilize around a 50:50 split if more than 3 managers were associated with the forecasting judgment.

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Forecasting the outcomes of Digital Policies in Greece using structured analogies

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This paper describes a series of experiments on forecasting the impact of Digital Planning Strategies and Policies in Greece with the use of Structured Analogies. The experiment was organized at the Forecasting System Unit of National Technical University of Athens. It included cases of Calls of the Special Secretariat of Digital Planning (x-Information Society Secretariat) in Greece that were organized in the form of structured analogies. We asked from a group of non-experts, which was comprised from undergraduate engineering students, to answer some questions for each case thus producing judgmental forecasts. The forecasts that we asked the participants to give are outcomes that have already been measured by the Observatory for the Information Society in Greece. In the structured analogies, the Calls were disguised in a way that the respondents wouldn't be able to identify the exact case and remain uninfluenced in their forecasts. The paper presents the preliminary results from the experiment, whereas further research will include the addressing of the cases to a group of experts.

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FIN4

Contributed Session: Financial Modelling II

Tuesday, 03:25pm-04:45pm Room: Le Mistral

Chair: Jin-Huei Yeh
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Option pricing with exponential affine stochastic discount factor in a GHD framework

Florian Ielpo, Christophe Chorro, Dominique Guegan
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For usual market conditions -- i.e. weakly increasing markets -- option pricing models lead to higher mis-pricing errors in the lower tail, since for such moneynesses the slope of the pricing kernel is the steepest. This is known to be the result of a higher skewness implicit in option prices than in historical returns. We show that with a GARCH model based on residuals following a generalized hyperbolic distribution and by assuming that the pricing kernel is an exponential affine function of the log of the asset price, we provide an good fit of option prices for such lower moneynesses by simply using no-arbitrage restrictions. Our methodology avoids the use of monte carlo based optimization and is thus time saving. We compare our mispricing errors to those of the Heston and Nandi (2000), Christoffersen and alii (2006) and Barone-Adesi and alii (2008) models.

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The Effect of the Spillover on the Granger Causality Test

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One of the most important issues in the subject of time series econometrics is the ability to statistically perform causality tests. Another equally important issue is the persistence in the variance of a random variable, evolving through time. Persistence in variance refers to the conditional variance; past volatility explains current volatility. Thus, the relation between information flow and volatility gives an interesting perspective to interpret the causation in variance between a pair of economic time series. The causation in variance between a pair of economic time series we call spillover. Absence of volatility spillover implies that the major sources of disturbances are changes in asset- or market-specific fundamentals, and one large shock increases the volatility only in that specific asset or market. In contrast, existence of volatility spillover implies that one large shock increases the volatilities not only in its own asset or market but also in other assets or markets as well. We now face two important issues, namely, "Spillover" and "Granger causality", and hence we have the following important question: Does spillover affects the Granger causality test? The main purpose of this paper is thus to investigate the properties of the Granger causality test in stationary and stable VAR models in the presence of spillover. The Wald test and the WW (Wald test with White's proposed heteroskedastic consistent-covariance matrix estimator (HCCME) imposed) are analysed. The Monte Carlo results show that the Wald test over rejects the null hypothesis both with and without the spillover effect, and that the over rejection in the last case is more severe in larger samples. On the other hand, the size properties of the WW test are satisfactory when there is spillover between the variables. Only when there is feedback in variance, the size of the WW test can be slightly affected. Regarding the power of the tests, the Wald test has shown to have higher power than the WW test when the errors follow a GARCH(1,1) process without spillover effect. In the presence of spillover, the power of both tests deteriorates implying a negative effect of the spillover on the causality tests.

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Smiled Dynamics of the Smile

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In this paper, we present a new stylized fact for options written on indexes. Fitting transversally (along moneyness) an autoregressive modelon the surface, we observe a smiled form for the estimated autoregres-sive parameter. Particularly insisting on the construction of the dataset, we show that this fact can be regarded as a regular pattern of implied volatility time-series by exploring its consistency for two indexes and maturities. We try to explain this new stylized fact and develop several arguments around market practices. Finally, we show that (1) usual stochastic volatility models are not consistent with it; (2) when introducing jumps in the Heston model, we recover this stylized fact: this suggests that a two-factor model for volatility may be compatible with the observed behavior of implied volatility.

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Forecasting Inter-Quantile-Range-Based Volatility with Applications in Value-at-Risk

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Finding a relevant volatility forecaster is important and crucial in empirical finance, in particularly in asset pricing, asset allocation, and financial risk management applications. In this paper, we evaluate the forecasting performance of a newly proposed Inter-Quantile-Range-Based volatility (IQRBV) estimator where it is known for its accuracy in approximation of integrated daily volatility and robust to microstructure noises and price jumps. The forecasting performance of IQRBV is compared with the other three popular volatility estimators: realized volatility, realized bi-power variation, range-based volatility, whose constructions are based on high frequency intra-daily information as well. Sampling intra-daily returns at 5-minute and 1-minute from the S&P 500 deposit receipt, an ETF to mimic S&P 500 index, on NYSE, we generate forecasts from a simple ARFIMA for the logarithmic volatilities under these different estimators. Our empirical results show that IQRBV outperforms all the other estimators in terms of MSE, irrespective of using in-sample or out-of-sample periods. Further applying these measures in assessing value-at-risk (VaR) with their 1-day ahead forecasts, we find that the upward-bias due to microstructure noises in realized volatility and realized bi-power variation also inflate VaR and thus being too conservative. However, both the bias-free IQRBV and range-based estimator offer admirable performance in terms of number of exceptions in our study.

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SSM1

Contributed Session: State Space Models

Tuesday, 03:25pm-04:45pm Room: Les Courants

Chair: Virginie Dordonnat
Electricité de France, Clamart, France

Hierarchical model for estimation of yearly sums from irregular longitudinal data

Marek Brabec, Ondrej Konar, Emil Pelikan, Marek Maly
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We will present a hierarchical statistical model based on state-space formulation, useful for estimation of yearly sums from numerous and irregular individual trajectories. It deals with a situation that arises in individual gas consumption modeling, but in other contexts as well. Relatively short time series of approximately yearly total consumption readings are available for many individual customers. As the reading intervals are not of the same length for different individuals, the consumption totals have to be corrected for different conditions (mainly for interval length and position inconsistencies and for different temperature occurring during the interval). Even after postulating a model that achieves the correction, there is substantial dynamics in the consumption level over longer periods (e.g. due to changes in gas prices, changes in gas appliances). Shape of the dynamics is driven by both common and individual customer-specific factors. In other words, interaction of time trajectory and individual is not negligible. To take these considerations into account, we propose a state-space model acting on two levels of hierarchy: individual and group means levels, allowing for individual specificity but shrinking the departures from common trend toward group mean trajectory in a Bayesian spirit. As such, the model can be viewed as a flexible, semiparametric mixed effects model allowing for extraction of several structural components with nice physical interpretation. In addition to general model formulation and description of the estimation techniques, we will illustrate how it can be used to estimate normalized group yearly totals (and appreciate estimates' precision). These are of substantial practical interest since they are needed as inputs to other models and important calculations. The work is supported by the Grant Agency of the AS CR, grant No. 1ET400300513.

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Parameter Space Restriction in the State-Space Model

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The state-space model is widely used for decomposing an economic variable into a permanent and transitory component. In this paper, we theoretically show that the parameter space of ARIMA models is restricted by the assumption of independently distributed noises in the equivalent state-space models. Also, we suggest a method to derive the restricted parameter space and apply the proposed method to most frequently used ARIMA processes.

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Inference for GARCH and related models with incomplete data

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Jeremy Penzer
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A novel state space representation for GARCH models is presented.with minimal state dimension. The associated filter may be used to generate a finite sample approximation to the conditional variance function. We evaluate objective functions, and hence estimate parameters, without making any pre-sample assumptions. Instead, we propose a weighting that allows us to take account of the additional uncertainty associated with approximating the conditional variance at the start of the series. Our filtering methodology provides a natural mechanism for dealing with missing values and for generating a smooth approximation the conditional variance function. Our method is readily extended to non-stationary and asymmetric cases.

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Dynamic factors in periodic time-varying regression models for electricity load forecasting

Virginie Dordonnat
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Siem Jan Koopman, Marius Ooms
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We consider dynamic multivariate periodic regression modelling for high frequency data. The dependent univariate time series is transformed to a lower frequency multivariate time series for periodic regression modelling. For hourly series we specify one equation per hour of the day. The regression coefficients differ across equations and vary stochastically over time. Since the unrestricted model contains many unknown parameters, we develop a methodology within the multivariate linear Gaussian state-space framework to model dynamic factors in the coefficients, with common coefficient dynamics across equations. We apply our method to French national hourly electricity loads to do short-term forecasting. The dataset is supplied by Electricite de France (EDF). We transform the univariate series to 24 daily time series modelled with different interpretable components: trend, seasonalities (weekly, yearly), regression effects (weather variables, special days/ periods effects). We compute MAPE to assess forecast accuracy up to 7 days ahead and compare the results with independent modelling for each hour. We present the results on a subset of hours.

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ITD1

Contributed Session: Intermittent Demand

Tuesday 03:25pm-04:45pm Room: Sirocco

Chair: Zied Babai
University of Salford, UK

A Conditional Leadtime Demand Distribution for Intermittent Demand Forecasts

Hans Levenbach
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The Croston method is the standard for forecasting intermittent demand found in the major forecasting and inventory planning support systems on the market. However, its drawbacks are numerous and have been reported in the literature for some time. The issues surrounding intermittent demand are particularly important for determining order-up-to levels in inventory control applications where intermittency in the historical data is found to be a major obstacle. In this talk, we introduce a conditional leadtime demand distribution from which stock out probabilities (right tails) can be determined even for distributions with heavier than normal tails. In this approach we avoid the usual assumptions associated with the Croston approach.

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Theta-Croston and Croston-Theta: investigating new ideas for Intermittent Demand forecasting

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Intermittent demand appears sporadically, with even some time periods showing no demand at all. A new intermittent demand approach via combining Croston's method and the Theta model has been presented in EURO 20007 in Prague. Following that preliminary research, this study investigates the use of the Theta Model in order to estimate a) the Volume Forecast or, b) the Inter-Demand interval forecast or c) both the Volume and the Inter-Demand interval Forecast, based on the Croston's method decomposition approach. Various generalizations and optimizations of the Theta model will be examined as to produce the aforementioned forecasts. Classical Seasonal Decomposition Method will also be applied in order to test and remove any seasonality. The smoothing parameters of the Exponential smoothing approaches used in Theta model will be optimized as well, instead of using a-priori fixed values as in earlier studies (i.e 0.05). The new approach is evaluated versus four established forecasting methods: Simple Moving Average, Single Exponential Smoothing, Croston's method, and SBA, the Syntetos & Boylan de-biased version of Croston's approach. The comparison is performed on 3000 real intermittent demand data series from the automotive industry. Various metrics are presented including ME, MAE, MAPE, SMAPE, relative errors as the relative geometric root-mean-square errors are used as well as the newly defined scaled errors (MASE, MSE).

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Demand forecasting and inventory control for intermittent demand

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Croston-type forecasting methods differ from traditional methods such as moving average (MA) and single exponential smoothing (SES) by separately forecasting the demand interval and the demand size. The have been specifically developed for intermittent demand (i.e. with many zeros) and seem more suitable for such demand patterns. Nevertheless, studies comparing Croston-type methods with traditional methods have lead to a mixed bag of results. In the first part of the presentation, I will argue that this can be explained by the inappropriate use of traditional performance measures such as MAD and MSE. Indeed, I will show for a large data-set from the UK Royal Air Force (RAF) that these measures actually favour a benchmark method, which always forecasts zero, over all other methods. Obviously, this benchmark method is not useful for inventory control. In the second part of the presentation, I will therefore discuss inventory related performance measures related to service level and holding cost. Results from these alternative measures for the RAF data-set clearly favour Croston-type methods over traditional methods, with the benchmark zero-forecast method performing even worse. Finally, we consider Bootstrapping as an alternative, and show that a simple variant ha similar performance as the Croston-type methods.

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An investigation on parametric and non-parametric forecasting for intermittent demands

Zied Babai, Aris Syntetos
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Some bootstrapping approaches have been proposed in the literature to deal with non-parametric forecasting of intermittent demands. The relevant studies claimed improvements in forecasting accuracy achieved over parametric approaches but nevertheless they have also been criticized in terms of their methodological arrangements and experimental structure. What is agreed upon currently in the academic literature is the need to broaden the base of empirical evidence in this field. In particular a comparison between some recently developed adaptations of Croston's method (in conjunction with an appropriate distribution) with some bootstrapping approaches should prove to be beneficial from both theoretical and practitioner perspectives. Such a comparison constitutes the focus of our research. More specifically we compare, by means of an empirical experimentation on a large demand data set, the forecasting and stock control performance of various parametric and non-parametric methodologies. A new non-parametric method based on the Kernel estimation recently proposed by one of the authors is also included in the comparison. The results allow insight to be gained on the relative benefits of those approaches.

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ELE2

Invited Session: Forecasting Elections in Europe

Tuesday, 03:25pm-04:45pm Room: Azur

Chair: Michael S. Lewis-Beck
University of Iowa, USA

Government popularity and electoral outcomes in Italy, 1994-2007

Paolo Bellucci
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Research on pre-1994 Italian politics gave little attention to studying popularity functions and forecasting electoral results. With the enactment of a new electoral law, the dramatic change of Italy's party system and the ensuing alternation in government of different political coalition, public opinion approval of government has acquired greater political and electoral relevance. This paper analyses government approval series between 1994 and 2007 and discusses how government approval influences electoral results in the Italian Second Republic.

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Forecasting Partisan Dynamics in Europe

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Veronique Jerome-Speziari
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Observers of democratic elections in Europe regularly speculate on the rise and fall of particular parties, or groups of parties. Is there a discernable and joined rhythm to the ebb and flow of governing partisan forces in European democracies? Or is there merely random movement, looking momentarily like a pattern, but soon vanishing? Here we first examine partisan cycles in the Fifteen (Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Portugal, United Kingdom, Austria, Finland, and Sweden), but aggregating country votes by year, treating the Fifteen as one geo-political unit, effectively as one nation "Euroland". Our data from these countries includes results from 125 national elections, 1978-2007. In a second time we build a politico-economic model in order to forecast "Euroland" partisan dynamics for the years to come.

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The Chancellor model: Forecasting German Elections

Helmut Norpoth
State University of New York at Stony Brook, USA

I present a forecast model for German Bundestag elections that relies on the following predictors of election outcomes: (1) the popularity of the incumbent chancellor (hence the christening of it as the "Chancellor Model);" (2) the long-term partisan balance in the German electorate; (3) the cost of ruling, as captured by the tenure in office. Predictions are made for the vote share of the governing parties (typically two, such as Social Democrats and Greens). Model parameters are estimated with elections going back to 1949. Model forecasts issued two months before Election Day picked the outcome in 2002 to the decimal (47.1 percent for the SPD-Greens coalition), and the one in 2005 with a deviation of only .3 percent. To use this model for the next election, it is necessary to solve two problems first: the existence of a great coalition, commanding close to three-quarters of electoral support, and the arrival of the new Left party.

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British Election Forecasts: A two-step model

Michael S. Lewis-Beck
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Richard Nadeau
University of Montreal, Canada

Eric Belanger
McGill University, Canada

We propose an original two-step model for forecasting general elections in the United Kingdom. The vote equation includes only one variable, the average of the government and the prime minister approval three months before the elections. This simple model performs very well in terms of the usual standards (variance explained, accuracy of the out-of-sample and step-ahead forecasts). The second equation includes two variables, the lagged dependent variable and a lagged economic index (based on the sum of the unemployment, inflation and interest rates), to explain the governmental and prime ministerial approval used in the vote equation. The results clearly show that the economy is an important factor in explaining the incumbents' standings in the proximity of general elections in the UK. Based on this model, we perform a certain number of forecasts based on reasonable assumptions about the approval of the Labour Party and Gordon Brown at the time of the next election.

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SEA2

Contributed Session: Seasonality II

Tuesday, 05:15pm-06:15pm Room: Baie des Anges

Chair: Carlos Diaz
Universidad de Cantabria, Spain

On X11 Seasonal Adjustment and estimation of its MSE

Michael Sverchkov, Danny Pfeffermann, Stuart Scott
Bureau of Labor Statistics, USA

Most official seasonal adjustments use the (nonparametric) X-11 method and its extensions. An important problem with this method is how to estimate errors in estimating the seasonal and other components. Wolter and Monsour (1981) introduce an approach to variance estimation that uses the linear approximation to X-11 and accounts for the effect of sampling error. Extending this approach are the methods of Pfeffermann (1994) and Bell & Kramer (1999). In this talk we show that under mild assumptions that can be tested from the observed data the seasonal and the trend components can be defined in such a way that (1) X11 estimates of these components are almost unbiased at the center of the series, (2) the Pfeffermann (1994) method gives unbiased estimates of the MSE of X11 estimates at the center of the series. We suggest bias correction procedures for the MSE estimate at the end of the series. The results are illustrated in a simulation study.

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New Way to Improve Forecasting Accuracy by Utilizing Trading Day Factors

Bill Yue
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Business forecasting requires accuracy. For time series forecasting, Exponential Smooth and Arima methods have been widely used. These two methods can capture trend (up or down) and seasonality (which month has higher/lower value) patterns from data and then carry out the forecasting. However, these methods fail to capture another very important component – Trading Day Factors (the days of composition in a month, i.e. how many Mondays, Tuesdays, …, Sundays are in a particular month). In auto insurance, for example, there may be fewer claims in a particular month simply because that month holds more Saturdays and Sundays than Mondays. (People tend to drive safer for family activities on weekends and traffic decreases during the weekend). Since current forecasting methods do not incorporate this component, not only are results less accurate, they create an error for estimation of the seasonality parameters and thus provide a wrong business picture for the decision maker. In this presentation, we will demonstrate how to capture Trading Day Factors by using modified X12 methodology and how to use this component in conjunction with Exponential Smooth or Arima method to improve forecasting accuracy and obtain better seasonality estimates.

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Testing for Noninvertibility in Seasonal Vector ARIMA models

Carlos Diaz, Jose Luis Gallego
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Optimum invariant tests for unit roots in seasonal moving average matrix polynomials of a general vector autoregressive moving average model are proposed. Such tests are useful to discover the presence of deterministic seasonal cycles, and can be applied to detect common seasonalities and seasonal cointegration. The finite-sample and limit distributions of the test statistics under the null hypothesis and a sequence of local alternatives are derived by means of numerical integration, and their performance in small samples is evaluated via simulation. Some examples are given.

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EBC9

Contributed Session: Macroeconomic Forecasting I

Tuesday, 05:15pm-06:15pm Room: Clipper

Chair: Antonello D'Agostino
Central Bank and of Ireland, Dublin, Ireland

Early Estimates of Euro Area Real GDP Growth: A Bottom-Up Approach from the Production Side

Frauke Skudelny, Elke Hahn
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This paper designs a euro area bottom up GDP forecast from the production side, i.e. based on the forecasts of value added across different branches of activity (industry, construction, agriculture, services, and sub-sectors of services), which is new in the literature. Sectoral value added is forecast with bridge equations using monthly indicators for the individual sectors. To that aim, a set of monthly variables that prove promising in forecasting sectoral value added is chosen and extrapolated with AR models. The bridge equations are estimated based on all possible combinations of the monthly indicators. The best ones in terms of their RMSE are selected for each sector and compared with the average forecast of the 10 best equations and a benchmark AR. The paper also adds to the literature by exploring whether the same set of equations should be used over the forecasting cycle. More precisely, as the purpose of the project is to produce monthly GDP forecasts for a given quarter, we run the model selection for seven different situations preceding the first full release of euro area national accounts: i.e. months 1 and 2 of the quarter after the forecasted quarter (both backcasts), months 1, 2 and 3 of the quarter which is forecast (nowcast) and months 2 and 3 of the quarter preceding the forecasted quarter (forecast). Overall, our selected monthly models outperform the benchmark AR models and the results confirm the importance of the production time of the forecast, as the selection of indicators differs substantially depending on how much information is available. In particular, the fewer hard data is available, the more survey indicators are selected. In addition, there is no strong evidence of a better forecast performance when using the average of the 10 best models as compared to the best individual model.

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Construction of coincident indicators for euro area key macroeconomic variables

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Gian Luigi Mazzi
Eurostat, European Commission, Luxembourg

The availability of timely and reliable information on main macroeconomic variables is considered both by policy makers and analysts crucial for an effective process of decision making. Unfortunately official statistics cannot always meet adequately users' needs, especially concerning their timely availability. This is the reason why, using econometric techniques, analysts try to anticipate or estimate in real time short-term movements of main macroeconomic variables. In this paper we propose a strategy simple and easily replicable in production processes for the estimation of the period on period growth rates of the euro area Industrial Production Index and Gross Domestic Product (GDP). Our strategy is based on the classical multivariate regression model on growth rates with autoregressive error term which is widely used in anticipating economic movements. Concerning GDP three different equations were identified, while for Industrial Production Index we have identified only two suitable representations. Furthermore for both variables we also use a purely autoregressive representation as a benchmark. We first compare alternative model specifications based on different sets of explanatory variables; the comparison is based on the statistical properties of the model estimated over the whole period. We perform then extensive real time simulations to better evaluate the forecasting ability of alternative models specifications. Furthermore, we also investigate if combining forecasting techniques can increase the reliability of our estimates. Alternative model specifications together with the combined estimates are compared using the Diebold-Mariano test. Concerning the sets of explanatory variables considered in this exercise we observed that quite surprisingly financial ones do not play a very important role in increasing the forecasting ability of our models while qualitative surveys data have a higher explanatory power. The results obtained appear to be encouraging especially for the Gross Domestic Product for which the root mean square error is close to 0.15 with respect to the euro area flash estimate available at around 45 days after the end of reference period. On the other hand for the Industrial Production Index, due also to the high level of volatility of this variable, the model still needs some improvements. The root mean square error compared with the first estimate of euro area IPI available at around 43 days after the end of reference period is close to 0.60 percentage points meaning that further improvements are needed. Despite these partially unsatisfactory results of different models for the industrial production index, their contribution to the construction of the coincident indicator of GDP remains relevant.

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Are sectoral stock prices useful for predicting euro area GDP?

Antonello D'Agostino
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Magnus Andersson
European Central Bank, Frankfurt, Germany

This paper evaluates how well sectoral stock prices forecast future economic activity compared to traditional predictors such as the term spread, dividend yield, exchange rates and money growth. The study is applied to euro area financial asset prices and real economic growth, covering the period 1973 to 2006. The paper finds that the term spread is the best predictor of future growth in the period leading up to the introduction of Monetary Union. After 1999, however, sectoral stock prices in general provide more accurate forecasts than traditional asset price measures across all forecast horizons.

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ENR11

Invited Session: Data Stream Approaches Applied to Forecasting: How to Use Individual Curves

Tuesday, 05:15pm-06:15pm Room: Fregate

Chair: Alain Dessertaine
Electricité de France, France

Data stream approaches for electric load curve analysis

M.L. Picard
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Georges Hébrail
Télecom ParisTech, Paris, France

Our objective is to show how data stream techniques can be useful for analysing and forecasting electric load curves. A data stream is defined as a set of structured records arriving in the form of a continuous and unbounded sized stream. In a first part, we present an overview of existing data stream techniques: Data Stream Management Systems and 'on the fly' data mining approaches. Then we discuss how these techniques can be used for measuring and forecasting electric load curves, collected through a wide use (34 millions) of automatic meters. Indeed Automatic Metering Management (AMM) is expected to be generalized in France within a few years.

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Optimized Clusters for Disaggregated Electricity Load Forecasting

Jean-Michel Poggi, M. Misiti, Y. Misiti, G. Oppenheim
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In order to take into account the variation of the EDF (the French electrical company) portfolio due to the liberalization of the electrical market, it is essential to be able to conveniently disaggregate the global signal. The objective is to disaggregate suitably the global load curve obtained by summing up all the individual curves in order to improve the prediction performance. The strategy is to optimize with respect to a previsibility index, a preliminary clustering of individual load curves. The optimized clustering scheme directed by forecasting is based on a cross-prediction dissimilarity index and a discrete gradient type algorithm.

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Wind Power Forecasting using streaming techniques

Ricardo Bessa, Vladimiro Miranda
University of Porto, Porto, Portugal

Joao Gama
Portugal

This work reports new results in online training entropy-based neural networks for wind power prediction as a function of wind characteristics in wind parks connected to a power grid.

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FIN12

Invited Session: Forecasting Financial Markets

Tuesday, 05:15pm-06:15pm Room: Le Gallion

Chair: Elena Kalotychou
Cass Business School, London, UK

How much capital to risk? Using ensemble methods to implement the Kelly Rule

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

The value of forecasts in financial market forecasts is typically evaluated by assuming that all cumulated capital is rolled into the trading position signalled by the forecast model. However, the strategy that maximises expected capital growth is known to involve trading only a fraction of capital, depending on the probability of profit, and the relative sizes of expected profits and losses (Kelly, 1956). This paper operationalises the Kelly rule, with positions determined by an ensemble of linear forecast models for the FTSE100 index, and time varying probabilities of success determined by the degree of unanimity among ensemble members.

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Exchange rates and fundamentals: footlose or evolving relationship?

Giorgio Valente
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Using novel real-time data on a broad set of economic fundamentals for five major US dollar exchange rates over the recent float, we employ a predictive procedure that allows the relationship between exchange rates and fundamentals to evolve over time in a very general fashion. Our key findings are that: (i) the well-documented weak out-of-sample predictive ability of exchange rate models may be caused by poor performance of model-selection criteria, rather than lack of information content in the fundamentals; (ii) the difficulty of selecting the best predictive model is largely due to frequent shifts in the set of fundamentals driving exchange rates, which can be interpreted as reflecting swings in market expectations over time. However, the strength of the link between exchange rates and fundamentals is different across currencies.

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Taking advantage of global diversification: a multivariate-GARCH approach:

Sotiris Staikouras, Elena Kalotychou, Gang Zhao
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We evaluate alternative models of variance-covariance matrices with economic loss functions. By investigating the performances of portfolios based on these estimators, we indirectly assess the estimation and forecast performance of the variance-covariance model. According to different needs of the investors, we construct the portfolio to maximize the expected Sharpe-Ratio or minimize the predicted portfolio variance. We extend our study from in-sample experiment to out-of-sample real-life scenario test. Two forecast methods have been proposed in this paper for the multivariate estimators, and the portfolios based on these forecast techniques will compete against the simple rival forecast models. In order to adopt the multivariate variance-covariance estimation model into the international diversification process efficiently, we proposed a new investment strategy. Based on the realized data, the new strategy has been proved to be the better alternative for investors compares to the conventional approach. On average, the portfolio based on the multivariate forecast outperformed the ones based on the simple rival models during the out-of sample performance comparison period, and the newly proposed global portfolio performed well under the real-life scenario.

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NPM2

Contributed Session: Non-Parametric Methods II

Tuesday, 05:15pm-06:15pm Room: Le Mistral

Chair: Han Lin Shang
Monash University, Australia

Forecasting Daily Cash Withdrawals by Nearest Neighbour Methods

Natalia Merkusheva, Tommaso Proietti
University of Rome "Tor Vergata", Italy

In this paper we propose nonparametric forecasting methods for daily seasonal time series that are grounded on the nearest neighbour framework. Nearest neighbour methods have found successful application in pattern recognition and forecasting exchange rates (see, among others, International Journal of Forecasting, vol. 15, 1999, pp. 383--392 and vol 18, 2002, pp. 67--83). We apply the methods to the 11 time series that make up the 2008 NN5 time series forecasting competition, whose prominent features are the presence of missing values, strong weekly seasonal effects and calendar effects. Both the missing values and weekly seasonality affect the calculation of the distances that are used to define the neighbours. For this purpose we propose and evaluate two strategies, the first consisting of calculating the set of neighbours on an appropriate moving average of the original time series, the second implementing a multivariate nearest neighbour methodology, based on the vector of seasons representation of the original time series, i.e., on the stack of the series referring to a particular day of the week.

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Forecasting functional data using partial least squares regression

Han Lin Shang, Rob Hyndman
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Functional time series data consist of a set of curves observed over time. For instance, age-specific mortality curves observed annually or term-yield curves observed weekly. To forecast such curves, it has become standard to decompose them via functional principal components regression and then apply univariate time series methods to forecast the coefficients. Principal components decomposition provides an optimal way of summarizing the historical data, but it does not necessarily lead to good forecasting. We aim to improve on this method by proposing a related nonparametric decomposition, based on functional partial least squares regression. Further, we emphasize the virtue of overparameterization in selecting the number of components for functional data forecasting. The proposed method will be illustrated using several real data sets.

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CLI2

Contributed Session: Climate and Environment II

Tuesday, 05:15pm-06:15pm Room: Les Courants

Chair: Hasan Al-Madfai
University of Glamorgan, UK

A model of Artificial Neural Network for the analysis of climate change

Francesca Intini, Silvana Kuhtz
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Vitoantonio Bevilacqua
Politecnico di Bari, Italy

In this work we have realised and implemented a neural network in order to investigate and simulate the relationship between CO2 emissions and some variables taken from national and provincial Italian statistics. The artificial intelligence application used in this study gives us the possibility to have a new forecasting model to study the earth temperature increase due to the climate change. This represents a danger for the environment but also for whole economy. The EBP proposed neural network can learn from previous experiences and use them to estimate the CO2 in the past, today and in the future. The variables have been chosen according to their connection with the solid fuels, oil, natural gas, electricity consumptions, Gross Domestic Product and resident population. We also did a study concerning the CO2 emissions impact related to natural gas, oil, solid fuels, electricity by taking in consideration the weighted average of the aggregated consumptions in macro-categories. This model allowed us to make an analysis of sensitivity in order to calculate the impact of each input parameter of the neural network on the total emission. Experimental results seem to argue that oil has the greatest impact on the emission. By this, it is necessary to delete the solid fuels, reduce the natural gas use by 40% ,the oil by 60%,the electricity by 20% in order to achieve the Kyoto agreement targets according to our model calculation. Moreover CO2 estimation model can be used to check the efficiency of the energetic policies adopted by each country in order to reach Kyoto targets.

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IPCC's Climate Forecasts and Uncertainties

Kjell Stordahl
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UN's Intergovernmental Panel of Climate Change (IPCC) released in 2007 their Fourth Assessments reports, AR4. The paper focuses on IPCC's long-term global temperature forecasts. Specific attention is put on some of the most important drivers in IPCC's climate models: The greenhouse gases (carbondioxide, methane, --), vapor and clouds. Their ability to absorb radiative forcing will be discussed. The paper discusses uncertainties in IPCC's long-term climate forecasting models. The models don't include potential effect of sunspots and cosmic radiation. The feedback effects of vapor and clouds are not modeled satisfactory. There are uncertainties in adjustments of temperature measurements because of changing environments. There are uncertainties in use of proxy data instead of really measured data. There are uncertainties in various set of measurements. The dynamic climate variations on the Earth including the whole atmosphere are mapped into very large and complex climate models. The models contain a huge number of variables with dynamic relationships based on feedback responses and delays. Uncertainties will be generated when these models are calibrated. IPCC develop long-term global temperature forecasts for 90 years ahead. The forecast modeling is not applying traditional forecasting principles and there are none references to traditional forecasting literature. The temperature forecasts are established based on simulations using different models also based on different emission scenarios. The paper shows that the IPCC temperature forecasts made in 2000, even for the lowest emission scenario assuming constant emission on year 2000 level are significantly higher than the real global temperature evolution 2000-2007. See K.Stordahl Contributed paper on Climate Forecasting pp 9-11, Oracle no 1, 2008. IPCC has so far not been able to quantify the uncertainty in their forecasts. To illustrate the uncertainties, IPCC makes simultaneously simulations from different models called ensamble simulations. Some results will be shown and the approach will be discussed.

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Understanding the variability in Edinburgh's daily air quality data: An application of the Hierarchical Profiling Approach

Hasan Al-Madfai, Andrew Geens, David Snelson
University of Glamorgan, UK

Modelling and forecasting of time series of concentrations of air pollutants (e.g. carbon monoxide (CO) and Particulates (PM10)) is essential in monitoring air quality and assessing whether set targets will be achieved. While many established time series modelling approaches transform the data to stationarity a priori, the explicit modelling and presentation of the non stationary components of the series in this application is essential to allow for further understanding of variability and hence more informed policies. The Hierarchical Profiling Approach (HPA) was used to model the multi-year daily air quality data gathered at St. Leonards (West Richmond Street Gardens), Edinburgh, UK spanning from 1st of March 2004 to 15th July 2007. The HPA is an avant-garde approach that explicitly models the non stationary component of time series data at different levels depending on the span of the component, so that within-year disturbances are at Level 1 and year-long variability such as seasonality is at Level 2, and so on. HPA decomposes the variability into deterministic, stochastic and noise and uses continuous models to describe the non-stationary components using the deterministic part of the model. The stationary stochastic component is then modelled using established approaches. The dataset modelled was the total daily concentrations of carbon monoxide. After modelling within-year events at Level 1, a harmonic regression with trend model was used to describe the weekly aggregates of the data at Level 2. This model was then sampled back in the daily domain and no evidence of a larger cyclical component was found. Wind-speed and a dummy intervention-variable indicating the implementation of the smoking ban were considered in a transfer function model. The concluding model included the present and one lagged observations of wind speed. The smoking ban variable was not significant. This model yielded residual MSE of 2.66 CO ppm.

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SFW1

Contributed Session: Software

Tuesday, 05:15pm-06:15pm Room: Sirocco

Chair: Michael Leonard
SAS Institute Inc., USA

Estimating SLA boundaries for complex business processes

Genady Grabarnik, Larisa Shwartz
IBM TJ Watson Research Center, USA

IT service providers typically must comply with Service Level Agreements that are part of their usage contracts with customers. Not only IT infrastructure is subject to service level guarantees such as availability or response time but also service management processes as defined by the IT Infrastructure Library (ITIL) such as change and incident processes and the fulfillment of service requests. SLAs relating to service management processes typically address metrics such as initial response time and fulfillment time. We consider SLA as a possible way of the service providers to confine losses. We build a service model for complex business processes and use it to estimate SLAs parameters boundaries by zeroing future losses.

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Disaster Recovery Planning: SLA to Infrastructure tradeoff

Laura Shwartz, Genady Grabarnik
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A disaster recovery planning provides a capability to the company to absorb the impact of a disastrous event and to prevent business failure. In this paper we focus on Immediate and Intermediate Recoveries, options which are typically use a shared third-party facility that has IT Infrastructure such as Computer Systems and Network Components. In case of immediate recovery, known as hot standby, the provision is made to recover service within 24 hours using for example mirroring technology. The intermediate recovery could take 24 to 72 hours, since the hardware and software has to be configured and data has to be restored. The recovery option is often dictated by industry standards, audit and legal requirements. Service Level agreements also provide valuable input to disaster recovery planning. By sustaining agreed on service levels, companies aim to mitigate such non-quantifiable costs as loss of client confidence and, as a potential result, lost sales and market share. However, the cost of recovery services provided by third-party could be very high. It often makes advocating and planning disaster recovery a painful exercise. Without considering probability of the disaster, we are looking into optimizing the cost of a disaster recovery based on established guarantees and required resource configuration. We consider the problem of dynamically selecting required for recovery resources among a set of options in a worstcase online framework. The model we study can be interpreted as a broad, abstract extension of the wellstudied online prediction model to a general decisiontheoretic setting. We show that the multiplicative weight update rule of Littlestone and Warmuth [20] can be adapted to this model yielding bounds that are slightly weaker in some cases, but applicable to a considerably more general class of learning problems.

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An Introduction to Similarity Analysis Using SAS

Michael Leonard, Michele A. Trovero
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Business organizations collect large amounts of time-stamped data related to their suppliers and/or customers through web sites or other transactional databases. A business can have many suppliers and/or customers and can have a set of transactions associated with each one. Mining these time-stamped data can help business leaders make better decisions by enabling them to listen to their suppliers or customers via their transactions. Each set of transactions can be large, making it difficult to perform many traditional data mining tasks. This paper proposes techniques for large-scale analysis using similarity measures combined with automatic time series analysis and decomposition. After similarity analysis, traditional data mining techniques can be applied to the results along with other profile data. This paper demonstrates these techniques using SAS/ETS®, SAS/STAT®, SAS ® Enterprise MinerTM, and SAS® High-Performance Forecasting software.

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NLM2

Contributed Session: Non-Linear Models II

Tuesday, 05:15pm-06:15pm Room: Azur

Chair: Adel Mohammadpour
Amirkabir University of Technology, Tehran, Iran

Testing fractional order of long memory processes: A Monte Carlo study

Zhiping Lu
East China Normal University, China

Dominique Guégan
Université Paris 1 – Panthéon – Sorbonne, France

Laurent Ferrara
Banque de France and CES Université Paris 1 – Panthéon – Sorbonne, France

Testing the fractionally integrated order of seasonal and non-seasonal unit roots is quite important for the economic and financial time series modelling. In this paper, the widely used Robinson test (1994) is applied to various well-known long memory models. Via Monte Carlo experiments, we study and compare the performances of this test using several sample sizes.

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Best linear prediction for linear fractional stable noise

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Linear fractional stable motion is an alpha-stable random process, self similar and has stationary increments. Increments process of LFSM, called linear fractional stable noise, can be used for modeling traffic of modern telecommunications networks. In this article a method for calculating the best linear predictor for linear fractional stable noise is introduced. The method can be extended to calculate the best linear predictor for log fractional stable noise, where it is an increments process of log fractional stable motion.

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K4

Plenary Session

Wednesday 8:15am-9:10am Room: Baie des Anges

Chair: Massimiliano Marcellino
Università Bocconi , Milan, Italy

Forecasting in Marketing

Philip Hans Franses
Erasmus University, Rotterdam, Netherlands

With the advent of advanced data collection techniques, there is an increased interest in using econometric models to support decisions in marketing. Due to the sometimes specific nature of variables in marketing, the discipline uses econometric models that are rarely, if ever, used elsewhere. This talk deals with techniques to derive forecasts from these models. Due to the intrinsic non-linear nature of these models, these techniques draw heavily on simulation techniques. Various illustrations are given.

Philip Hans Franses is Professor of Applied Econometrics and Professor of Marketing research, both at the Erasmus University Rotterdam. His research interests are econometrics, time series, forecasting, marketing and empirical finance. He publishes on these topics in international journals and in books. He currently serves as the Dean of the Erasmus School of Economics.

EBC4

Contributed Session: Business Surveys I

Wednesday, 09:20am-10:40am Room: Baie des Anges

Chair: Michael P Clements
University of Warwick, UK

Assisted Forecasting for Linking Non Overlapping Time Series

Susie Fortier, Benoit Quenneville
Statistics Canada, Ottawa, Canada

Survey redesign and other changes in the methods of repeated surveys can introduce breaks in the related time series. In an ideal situation, a parallel run is perform to estimate said break and to decide if a linking or bridging exercise is required. When a parallel run is not feasible, segments of time series which share no explicit overlapping period must potentially be linked. Presented here are two detailed examples of this from Statistics Canada: linking evaluation for the Industrial Consumption Energy Survey and bridging the Canadian Travel Survey to the new Travel Survey of Residents of Canada. A common reference period is established with forecasts. Automatic forecasting tools such as SAS Forecast Studio and X-12-ARIMA are used, compared and complemented with a multivariate reconciliation strategy when necessary.

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Measurement of Economic Expectations with the Visual Analog Scale

Anna Stangl
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Economic expectations are playing a decisive role in determining economic activity. Their measurement therefore appears to be of particular interest to economists in various fields. In business tendency surveys, the measurement of economic expectations traditionally consists of three general categories: positive replies, indifferent replies and negative replies. Visual analog scale (VAS) with anchored ends (bad/worse vs. good/better) is an attractive alternative to a coarse 3-point scale as respondents can express their expectations on a continuum, which allows for a subtle distinction of their preferences. VAS is applied since 2005 in two major surveys of the Ifo Institute for Economic Research – the Ifo Business Survey in Manufacturing and the Ifo World Economic Survey, which polls more than 1,000 economists in over 90 countries. As the visual analog scale is a completely new instrument in business tendency surveys, the paper introduces its core idea and reports about the first experience of its application. The aim of the paper is to present a new method for the measurement of business confidence – the visual analog scale – and to compare it to the traditional three-category-scale with respect to its reliability and the forecasting properties. A side product of the study, however, is a comprehensive test of the traditional three-category scale, applied in the majority of business tendency surveys world-wide. Four general classes of reliability estimates are applied in the paper: Parallel-forms reliability, internal consistency reliability, inter-rater reliability and test-retest reliability. The results from the parallel-forms reliability estimates indicate that the two scales are highly correlated and have a high degree of agreement measuring the variables present economic situation and economic expectations. For the variable present economic situation, the visual analog scale appears to be superior to the categorical scale relating internal consistency and inter-rater reliability.

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The Reliability of Forecast -an Anonymous and Non-anonymous forecast-

Yasuyuki Komaki
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There are two publication types in forecast survey. One is the survey that withholds the name of respondent; the other is open to the public as non-anonymous respondent. As a general rule, many surveys of professional forecasters are collected by specified (non-anonymous) respondent originally, but these surveys are released as the anonymous respondent. For example, ifo business survey, the Survey of Professional Forecasters by US Federal Reserve Bank of Philadelphia and TANKAN by Bank of Japan. On the other hand, there are non-anonymous surveys of economic condition forecast collected by newspaper or economic publication. The purpose of this study is to compare the statistical properties between anonymous and non-anonymous reports in the survey of professional forecasters using USA and Japanese data. In order to examine the statistical properties of forecast, we use two tests; one is panel data analysis for examination of the mechanisms behind expectations formation. The other is the Pearson Chi-square Tests for conditional independence between series in the group. We can summarize the results as follows. 1)In case of Japan, an anonymous forecast is independent for other forecaster. We confirm that anonymous forecast is biased. One forecast is almost always lower level than market consensus, the other is almost higher. On the other hand, non-anonymous forecast is homogeneous. 2)In case of USA, both an anonymous and non-anonymous forecast is independent for other forecaster. These results suggest whether forecasters are at liberty to report the forecast, or not. In the case of Japan, non-anonymous respondents make forecasts based only on behalf of organization, therefore non-anonymous respondents prefer to market consensus. But if the same forecaster becomes anonymous, he has the freedom of speech or makes an irresponsible forecast.

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Consistency of survey respondents' forecasts: Futher Evidence based on the Survey of Professional Forecasters

Michael P Clements
University of Warwick, UK

A comparison of the point forecasts and central tendencies of probability distributions of inflation and output growth indicates that the point forecasts are optimistic relative to the probability distributions for some responses. We consider and evaluate a number of possible explanations for the discrepancies, which include the degree of uncertainty concerning the future, and computation costs. We also consider the relative accuracy of the two sets of forecasts, and conclude that for first moment prediction, the point forecasts are to be preferred.

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FIN5

Contributed Session: Portfolios

Wednesday, 09:20am-10:40am Room: Clipper

Chair: Christine De Mol
ECARES, Universite Libre de Bruxelles, Belgium

Stock Selection Modeling and Data Mining Corrections: Long-only versus 130/30

John Guerard, Sundaram Chettiappan
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In this study we show the importance of estimating Data Mining Corrections tests using stock selection models in U.S. and World equity markets. We create mean-variance (MV), Equal Active Weighting (EAW), and 130/30 efficient portfolios for EAFE stocks in the U.S. from 12/1996 – 12/2007 using 12 stock selection models. We examine the incremental returns of the strategies and the effective of leverage using the Markowitz and Xu Data Mining Corrections test.

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Linking Momentum Strategies with Single-Period Portfolio Models

Woo Chang Kim, John M. Mulvey, Mehmet Bilgili
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Several versions of the Markowitz portfolio model are evaluated with respect to current patterns in equity markets. Much research has shown that strategies based on momentum have generated superior risk adjusted returns throughout the world. We form a long-only portfolio of momentum strategies via industry-level assets and it beats many others over numerous markets and time periods. The momentum strategy provides a good benchmark for competing optimization models. Empirical evidence shows that, as compared to its robust versions, simple Markowitz models are quite effective, as long as the proper historical time period is chosen for the stochastic projections. Also, the investment performance of optimal asset allocation models can be improved by considering the momentum effects in the parameter estimation procedures.

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Sparse and stable Markowitz portfolios

Christine De Mol
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Josh Brodie, Ingrid Daubechies
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Domenico Giannone
European Central Bank, Frankfurt am Main, Germany

The Markowitz mean-variance optimizing framework has served as the basis for modern portfolio theory for more than 50 years. However, efforts to translate this theoretical foundation into a viable portfolio construction algorithm have been plagued by technical difficulties stemming from the instability of the original optimization problem with respect to the available data. Often, instabilities of this type disappear when a regularizing constraint or penalty term is incorporated in the optimization procedure. This approach seems not to have been used in portfolio design until very recently.We reformulate the problem as a constrained least-squares regression problem and we propose to add to this quadratic objective function a penalty proportional to the sum of the absolute values of the portfolio weights (L1-type penalty). This penalty not only regularizes (stabilizes) the optimization problem, but also encourages sparse portfolios, namely portfolios with only few active positions corresponding to the non-zero weights. Moreover, the penalty can be interpreted in terms of transaction costs which are thus controlled in a transparent way. We also show that our approach is a natural generalization of the no-short-position constraint, known in practice for its stabilizing effect, but unlike that constraint, it does allow for short positions in limited number. We implement this methodology on several benchmark portfolio datasets. Using only a modest amount of training data, we construct sparse portfolios whose out-of-sample performance, as measured by Sharpe ratio, is consistently and significantly better than that of the naive portfolio comprising equal investments in each available asset and constituting, as shown in recent literature, a very tough benchmark for portfolio construction. We conclude by discussing a collection of portfolio problems that can be naturally translated into optimizations involving L1-type penalties and that can thus be tackled by similar algorithms.

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EBC5

Contributed Session: Business Surveys II

Wednesday, 09:20am-10:40am Room: Fregate

Chair: Saverio Simonelli
European University Institute, San Domenico di Fiesole, Italy

Forecasting Quarter-on-Quarter Changes of German GDP with Monthly Business Tendency Survey Results

Klaus Abberger
IFO Institute, Munich, Germany

First official releases of quarterly national accounts are published with some delay. In Germany the Federal Statistical Office publishes the first official estimate of real GDP about 45 days after the respective quarter. To obtain a more timely forecast of GDP growth, high attention is paid to various monthly indicators. The basic idea of this article is to use the monthly business tendency survey results for Germany more extensively. Usually different kinds of questions are contained in the questionnaire, some which focus on the the last months (How has the stock of orders changed in the last month?) some about the present situation (How do you assess the present stock of orders?) and some about the coming months (How will production develop in the coming three months?). But not only the time horizons of the questions are different, also the asked items may have different leading behaviours. There are, on the one side, for example, questions about the stock of orders, and, on the other, questions about production, which usually have different lead times. Thus we analyze whether quarter-on-quarter changes in real GDP can be forecasted with the help of these extensive survey results. A novelty in this study is that these detailed survey results are used to forecast quarterly GDP growth. The present study focuses on German GDP data and survey results provided by the Ifo Institute. Since numerous time series of possible indicators result from the surveys, methods that can handle this setting are applied. One candidate method is principal component analysis or a recent variant of it, the supervised principal component annaysis suggested by Bair, E., Hastie, T., Paul, D., Tibshirani R. (2006), which is used to reduce dimensionality. On the other hand, subset selection procedures are applied.

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Predicting the Directional Change in Consumer Sentiment

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The consumer sentiment index is a widely monitored economic indicator. This paper employs the framework of survival analysis to model and forecast the probability of directional change in the index. Up-state runs are runs when the changes in the index are positive and the down-state runs occur when index changes are negative. We predict the probability of change from an up-state to a down-state run, and vice-versa. It is found that the lagged changes in consumer sentiment and the frequency of recent reversals of sentiment are significant variables in determining the probability that the current run of consumer sentiment will continue or reverse. In particular, for up-state runs a positive change in sentiment at lag2 increases the probability that the run will continue. Otherwise, a negative change at lag2 will increase the hazard and increase the chance of a reversal. Additionally, an increase in the frequency of prior changes reduces the probability that the run will continue. For down-state runs a negative change at lag2 increases the probability that a down run will continue, while the increase in the frequency of prior changes has same effect as in up-state runs. In out-of-sample forecasts, the model is found to have predictive power as measured by probability scoring rules that include the Brier Score.

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Do Business Tendency Surveys in Industry and Services Help in Forecasting GDP Growth? A Real-Time Analysis on French Data

Hélène Erkel-Rousse, Christelle Minodier
INSEE, France

Business tendency surveys (BTS) carried out by the statistical institute INSEE are intensively used for the short-term forecasting of the French economic activity. In particular, the service BTS has been used together with the industry BTS for the short-term forecasting of GDP growth since Bouton and Erkel-Rousse (2003) showed that the former survey contained a specific piece of information on GDP growth with respect to the latter survey. However, it remained to be demonstrated that this specific piece of information permits one to significantly improve the quality of short-term GDP forecasts with respect to models involving variables from the industry survey exclusively. More generally, the predictive accuracy of models based on the two surveys with respect to simpler autoregressive (AR) models deserved to be assessed. We, therefore, perform a real-time out-of-sample analysis which consists in estimating, then simulating miscellaneous kinds of models (VAR and univariate multistep models) aimed at the short-term forecasting of the quarterly GDP growth rate. Some BTS based models encompass industry and service data, others exclude service data. The predictive accuracy of these two kinds of models is compared to that of simple AR models; that of models including service data is also compared to that of models excluding them. Predictive accuracy tests (Harvey, Leybourne and Newbold, 1997, Clark-West, 2007) are performed up to four-quarter forecast horizons. To assess the robustness of the results, we carry out both recursive and rolling estimations as well as three tests (differing by the method used to estimate the variance of the test statistics' numerators) for each couple of competing forecasts. The results establish the usefulness of the two BTS, as well as the contribution of the service survey in the months (January, April, July, and October) when long enough service series are available.

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Do surveys help forecasting GDP in real time? Evidence for the Euro area

Saverio Simonelli
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Domenico Giannone, Lucrezia Reichlin
European Central Bank, Frankfurt am Main, Germany

This paper investigates whether business surveys are useful for forecasting Euro area GDP growth rate. We propose a new methodological approach to exploit, in a quarterly forecasting equation, the real time data flow of monthly information. The approach consists in maximum likelihood estimation of mixed frequency VARs. The Euro area GDP is released with a substantial delay - about three months after the end of the quarter. This is why timely monthly data are typically used to compute early estimates of current GDP and short-term forecasts. These are either data that reflect market expectations ("soft data") or data that are directly tied to GDP ("hard data"). Soft data are interesting because they are released earlier than hard data. In order to exploit monthly data for quarterly GDP forecasts, we model the GDP as the quarterly aggregate of a latent monthly variable. We estimate small scale VAR to assess the information content of a range of survey series at different level of disaggregation. We also exploit all the disaggregated information in two different ways: (1) VAR on GDP and a latent factor driving all the monthly data; (2) pooled VARs. The VAR's and the factor model are estimated by Maximum Likelihood using the Expectation Maximization algorithm. Both approaches can be considered a generalization of the so-called bridge model. The advantage over simple bridge equations is that VARs allow to take into account feedbacks from the quarterly variables to the monthly indicators. Our empirical analysis uses a unique data set of real-time data for the Euro area, including 15 different business surveys (plus 6 aggregates of them). In the spirit of the real-time literature, we forecast using sequential information sets that were available historically, therefore controlling for the non-synchronization of data releases and data revision. Our findings reveal that business surveys are helpful in forecasting GDP in the current quarter and also one and two months after the end of the quarter. We also show that models with both surveys and industrial production produce a sizable increase in the predictive accuracy relative to models based exclusively on industrial production.

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EBC10

Contributed Session: Macroeconomic Forecasting II

Wednesday, 09:20am-10:40am Room: Le Gallion

Chair: Roberto Golinelli
University of Bologna, Italy

Cognitive graphs and regression models in regional macroeconomic forecasting problems

Danila Karbaev
Samara, Russia

In this work the regression-cognitive models of oriented graphs are considered. These models are applied to analysis and forecasting basic macroeconomic indices of regional growth. Such indices are used to describe different parts of economic processes which are based on many factors. For each of the processes the models of connected factors are organized in the macroeconomic aspects. They are presented (for Russian econometric models) in the form of following accounts: Production Account (PA), Generation of Income Account, Final Expenditure Account, etc. Each of the accounts has its own collection of leading indices. Therefore the concept of cognitive graphs was used to create forecasting models for such indices. At the same time it was hard task to create a single multifold graph of economy growth. A large amount of sample data needed to be gathered to build a forecasting model. In addition to the data series that was to be forecast, data were needed for each of the independent variables over the historical time period and the forecast horizon. The main problem of macroeconomic forecasting on regional level is to predict the Gross Regional Product (GRP). That is why the PA was selected as the basic aspect to create the forecast. Using the dependencies of the PA the model of cognitive oriented graph was created. The graph displayed the apparent relations. At the same time there were implicit mediate relations between basic indices, which we had replaced to explicit immediate ones. These relations were detected using the multiple regression. It was applied to basic indices. To extend the amount of sample data the autoregression techniques were used. After the model was built, the forecasting algorithm was created to predict the data for the period of 10 years. The experimental results of proposed methods provided better accuracy than traditional time-series methods.

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A dynamic panel data approach to forecasting the real GDP of German Laender

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In this paper, we make multi-step forecasts of the annual growth rates of the real GDP for each of the 16 German Laender (states) simultaneously. Beside the usual panel data models, such as pooled and fixed-effects models, we apply panel models that explicitly account for spatial dependence between regional GDP. We find that both pooling and accounting for spatial effects helps substantially improve the forecast performance compared to the individual autoregressive models estimated for each of the Laender separately. More importantly, we have demonstrated that effect of accounting for spatial dependence is even more pronounced at longer forecasting horizons (the forecast accuracy gain as measured by the root mean squared forecast error is about 9% at 1-year horizon and exceeds 40% at 5-year horizon). Hence, we strongly recommend incorporating spatial dependence structure into regional forecasting models, especially, when long-term forecasts are made.

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Forecasting the Final Vintage of the Index of Industrial Production

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Index of industrial production (IIP), as a leading economic indicator, is the most widely scrutinised and intensively studied of all economic time series. However, this index is revised several times before a final figure is published. The time between the publication of the initial and final data is a lengthy one and thus forecasting the final vintage of data on IIP is an important issue. In this paper, the performance of the multivariate Singular Spectrum Analysis (SSA) technique is assessed by applying it to the first twelve vintages of the index of industrial production. The results show that the preliminary vintage can not be viewed as an accurate forecast of the final vintage and using SSA enables us to obtain more accurate forecasts in terms of reducing the mean square errors. We also find that SSA performs well in predicting the direction of change.

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Forecasting monthly industrial production in real-time: from single equations to factor-based models

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The aim of this paper is to analyze the performance of alternative forecasting methods to predict the index of industrial production (IPI) in Italy from one- to three-months ahead. We use twelve different models, from simple ARIMA to dynamic factor models exploiting the timely information of up to 107 short-term indicators, both qualitative and quantitative. This allows assessing the relevance for the forecasting practice of alternative combinations of types of data (real-time and latest available), estimation methods and sample windows. Out-of-sample predictive ability tests stress the relevance of more indicators in disaggregate models over sample periods covering about a complete business cycle (about 7 years in Italy). Our findings downgrade the emphasis on both the estimation method and, opposite to many results in the literature, data revision issues. In line with the classical "average puzzle", the use of simple averages of alternative forecasts often improves the predictive ability of their single components, mainly over short horizons. Finally, bridge and factor-based models always perform significantly better than ARIMA specifications, suggesting that the short-run indicator signal always dominates the noise component. On this regard, the researcher's skill can further increase the amount of signal extracted to improve up to 30-40% the short-run predictive ability of factor-based models and to forecast-encompass them. The paper is organised as follows. In Section 2 we classify all the models we use on the basis of the information content they embody. Section 3 illustrates the main methodological issues in modelling and forecasting the Italian IPI with indicators in real-time. In order to list pros and cons of alternative IPI forecasting methods, we generalise the decomposition of the forecast error to account for both real-time data and the timing of the indicator updates. Section 4 is devoted to the analysis of the out-of-sample performance (from one- to three-months ahead) of the models with specific indicators in predicting the IPI. Section 5 deals with the IPI forecasting ability over the same horizons of the unstructured empirical indicator models (i.e. factor-based models). Section 6 discusses and summarises main findings.

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NN2

Contributed Session: Theory of Neural Networks in Forecasting

Wednesday, 09:20am-10:40am Room: Le Mistral

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

Exploring Neurosolver's Forecasting Capabilities

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Neurosolver is a connectionist architecture based on the hypothesis that the hyper-column plays a vital role of a place cell in a human brain. We extended the notion of a place to a state in any N-dimension space - e.g., places, features, concepts, states of mind, etc. - and then proposed a mechanism that allows for statistical recording of trajectories that correspond to mobility, behavioral paths, lines of thought, etc. We demonstrated the use of the recorded temporal patterns in problem solving puzzles and in controlling a rat running in a maze. Solution paths in those experiments were constructed using spreading activity in reverse traversals from the node representing the goal state (stimulated by a limbic signal) to the nodes prepresenting all possible states that might be starting points that we called solution triggers (stimulated by a thalamic input). We published several papers with reports on the main architecture and follow-up improvements. We also mentioned another capability of the Neurosolver that we have never closely scrutinized afterwards. We take this opportunity to discuss that capability - as described below - with the participants of this workshop on prediction with neural network. In that second nature, the Neurosolver can play the role of a predictor of the next state, or a set of next states. This capability is similar to predicting capabilities of Hidden Markov Models, although the underlying mechanism is different. When the Neurosolver is exposed to stimulus having source in the observed system, it builds a behavioral model of the system through encoding temporal sequences of system states. If instead of the increasing activity being applied to the goal node - as done when the Neurosolver works in the problem solving mode - the thalamic input of a node that represents the current state is stimulated, then the activity will travel through the connections along the learned trajectories. Since the weights of the connections are based on statistics, then the state that is represented by the node with the highest activity is the most likely next state of the system. Certainty levels can be controlled by manipulating threshold values for both afferent and efferent connections. A complete behavioral pattern can be predicted for an off-line static system. Dynamic predictions can also be done by feeding the Neurosolver with real-time state updates that modify patterns of node activity.

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Prediction of Fast and Slow Dynamics Based on the Diploid Model with Neural Networks

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Complicated time series usually exhibits various dynamics and single model is not adequate to describe such dynamics. For simplicity, it is reasonable to classify those dynamics into two categories: fast dynamics and slow dynamics, which determine the short-term and long-term varying tendencies of the time series respectively. We thus aim to develop an approach of double multilayer feed-forward neural networks, denominated as the diploid model to capture both dynamics. The long time-scale inputs are fed to the first (global) network while the short time-scale inputs are selected for the second (local) network. Both input sizes are approximated by the technique of phase space reconstruction. At step 1 an optimal global neural network determined by the minimal description length makes the prediction on the original time series to follow the slow dynamics. Local dynamics tends to exist in the model

residual of the first one. So at step 2 a local neural network is constructed to remedy global model prediction, i.e. capture the fast dynamics in the residual. The final output of our diploid model is the linear
operation of outputs of the two networks. We illustrate our idea with one computational data (combination of the Lorenz system and Ikeda map), where the Lorenz data generates slow dynamics and the Ikeda data introduces the fast fluctuation. The preliminary results have showed that the diploid model outperforms either individual model. We are applying our approach to similar experimental data, such as electrodiagram (ECG) data and stock market data which also appear short-term and long-term tendencies but more complicated than the above computational data.

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Forecasting with History Consistent Neural Networks

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Typically, forecasting models act on a data window of the past to forecast the future. Given a time series, the model is adapted to many time windows in the training. Now let us assume that we have to analyse a long memory system (e.g. in energy markets). There it would be optimal to unfold the model over the whole time series. Unfortunately, this implies that we have only one traning example - the history itself. Because of the length of the unfolding such models should be good in the reconstruction of the hidden states of the dynamical system of interest. The talk shows a way to handle the situation in a neural network framework.

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Evaluation of the specification of the input vector for multilayer perceptrons using stepwise, forward and backward regression

Nikolaos Kourentzes, Sven F. Crone
Lancaster University Management School, UK

Neural networks (NN) have received increasing attention in time series forecasting. Although the interaction of many modelling decisions is still open to discussion, prior research suggests that an adequate selection of time-lagged input variables has the highest impact on forecasting accuracy. Although input variable selection should therefore merit paramount attention in research and practice, no methodology has been universally accepted. As a consequence, a variety of competing approaches have been explored motivated form statistics, utilising basic heuristics such as a full season, autocorrelation analysis (of ACF & PACF) or iterative forms of regression modelling. Despite the apparent disconnect in using linear regression modelling to identify nonlinear interdependencies between variables, the omnipresent regression has demonstrated promising results in NN modelling. However, to date no evaluation adheres to the established standards of a systematic, valid and reliable empirical evaluation, i.e. using a homogeneous set of representative time series, multiple time origins, fixed forecasting horizons, robust error measures and multiple hypotheses to test the conditions under which this input variable selection methodology performs well in comparison to established benchmarks. This research present a multifactorial design to evaluate the use of stepwise, forward and backward linear regression to specify the input vector of NN, considering three maximum lag lengths. Hamilton's flexible nonlinear regression is also evaluated. The NNs specified through linear regression are compared against NN modelled using the heuristics of full season or a single lagged observation to specify the input vector and a set of representative statistical benchmark methods, including naive, exponential smoothing and ARIMA models. All approaches are evaluated on a synthetic dataset of 48 time series as a combination of linear, exponential and degressive trends with additive and multiplicative seasonality, across four levels of increasing noise, in order to estimate the conditions under which the methodologies perform well.

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FIN8

Contributed Session: Financial Modelling

Wednesday, 09:20am-10:40am Room: Les Courants

Chair: Carl Lonnbark
Umeå University, Umeå, Sweden

Modeling stock index time series through decomposition

Alesa Lotric Dolinar
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When modeling Slovenian blue chip stock index (SBITOP) time series we compare two different approaches. On the one hand, we model the SBITOP series per se, while on the other hand we decompose the index and separately model the time series for the 10 most liquid Slovenian stocks that make up the SBITOP. First, all the models, the index time series model as well as the 10 composing stocks time series models, are set up by including the nonlinear volatility component, since these time series (as most of the financial time series) turn out to be very volatile. That is, we do the modelling with the ARIMA family models that are expanded by the volatility term. This is done in two ways – we include the conventional GARCH term with one and the more recent LAVE (Locally Adaptive Volatility Estimate) method with the other set of models. Then we put the 10 estimated components back together, taking all changes in index structure and all consecutive correction factors into account. Thus we get two different index forecasts – one directly and the other through decomposition, separate component modeling and resumed composition. Besides, we also find out, which volatility expansion, GARCH or LAVE, is more effiicent in our case. Next, we compare the different modeling approaches from the goodness of fit, as well as from the quality of forecasting point of view (here, we consider different error measures). And finally, we comment the results.

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International dependence of Chinese stock markets: a forecasting perspective

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The stock market of China mainland used to be secluded with respect to international economic affairs in the past. Today's globalization of markets, however, necessitates a reassessment of international dependence of Chinese stock markets, as reflected in its major stock indices SSE Composite (Shanghai), Hang Seng (Hong Kong), and TSEC (Taipei). Our investigation, which is mainly based on bivariate generalized Pareto distributions, focuses on the degree of dependence of extreme returns. For example, we find evidence that a huge loss in the US stock market is much more likely to entail a huge loss in the SSE Composite during a bear period than during a bull period in the US. Moreover, we found asymmetry in the interaction of stock markets insofar as a bear period in the US market has much more impact than a bear period in the Chinese stock market. We can also show that the dependence of joint threshold exceedances in the Chinese and Western stock markets has increased, the extent of increase being particularly pronounced in bear periods. Our findings lend themselves to a short-term forecast of high volatility as well as to sketching a long-term scenario for Chinese and international stock market dependence.

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A Corrected Value-at-Risk Predictor

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Value-at-Risk (VaR) has become a standard measure of market risk and is widely used by financial institutions and their regulators. In fact, the Basel Committee on Banking Supervision imposes on financial institutions such as banks and investment firms to meet capital requirements based on VaR. Accurate VaR estimates are therefore crucially important and VaR has already received much attention in the literature. Although the literature dealing with different modelling issues is large, surprisingly little is written about the uncertainty of VaR predictors. Predictors of VaR are open to two main sources of errors: The true data generating process is not known, which gives rise to model risk, and the parameters of the hypothesized model must be estimated, which gives rise to estimation risk. The question a practitioner naturally poses is how uncertainty in the VaR affects risk management, i.e. does it in some way change what value to report. The focus of this paper is the question of how to incorporate the estimation error in the VaR predictor. In particular, we take a time series model and argue that the implied conventional VaR predictor underestimates the portfolio risk. We emphasize that this is due to the fact that the VaR predictor is random and it is not due to conventional bias, i.e. that the expected value of the VaR predictor is different from the true value. It is relatively straightforward to correct the predictor to give the correct risk measure interpretation and a simple correction is proposed. The importance of the correction is studied for FTSE 100, Nikkei 225 and S&P 100. We find that it is economically relevant.

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JUD1

Contributed Session: Judgmental and Scenario Forecasting

Wednesday, 09:20am-10:40am Room: Sirocco

Chair: Andreas Graefe
Institute for Technology Assessment and Systems Analysis, Karlsruhe, Germany

Exploring approaches to studying forecasting effectiveness in organisations

Charlotte Brown
Lancaster University Management School, UK

The business of forecasting is generally assumed to be understood: forecasters choose or develop models which allow them to predict the future performance of an important variable of interest to their organization, aiming for a certain degree of accuracy. Much of the research that takes place in the field is therefore related to the development of better forecasting models that improve the accuracy of predictions, and on resolving the associated problems that arise from the implementation and use of these models. This view of forecasting is often insufficient to explain the complex appropriation and interpretation of forecasting models and data within organizations. Within an organization, forecasts are not simply outputs of rational models, but also the result of complex contextual and social work practices which involve many actors, both human and technological. The forecast outcomes are in turn inputs within a complex process of collective decision-making that render the data not as definitive answers, but as contentious points of view. This paper will review the existing literature which examines forecasting effectiveness in an organizational context, finding that these studies focus on how effectiveness is hampered by differences in managerial education about forecasting, issues of systems performance and integration, and/or issues of power and politics within organizations. It will then go on to consider methods of research enquiry into work practices used in other academic fields, and to consider how these might be fruitfully applied to the study of forecasting in organizational settings. It will conclude with some possible avenues for future research.

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The prediction of competitive environment in business

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The article deals with the method of prediction of competitive environment. The two dimensional partial differential equations of second order are used for the prediction of competitive environment in business. The article presents the deduction of equations necessary for the calculations. It explains the used variables and their interpretation in competitive environment. The way of build up of a model is described and it leads into a PC program. The test case explains the way of the use of designed methodology and computer program. The second case presents application on a real case and the results are evaluated. The methodology includes the dynamic phenomena and the computer program is very flexible for the set up of conditions, restrictions and obstacles. The mentioned newly designed methodology is focused on the field of business where the competition environment plays a very important role. The suggested program enables the search for competitive environment that could be very important and its results can be used for decision making processes. The calculation can prevent great looses. The designed method can be used in the field of markets, banks, firms, supplier-customer relations etc.

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Putting Theory into Practice: Enhancing the Forecasting Capabilities of Industry Groups

Jon Prest
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This presentation focuses on the implementation of best practice forecasting techniques to forecast the market size of two separate but related service industries, both in the short and longer term. As earlier research on forecasting practise has shown, the lack of adoption of current forecasting principles, that guide best practise, significantly inhibits the implementation of effective forecasting processes within organisations. The research is based around the use of the Delphi Technique to form expert panels across companies within the two industries. The task is to convince and educate potential panel members to pool judgmental forecasts in a structured manner. The education process also looks to minimise potential forecasting bias and encourage the efficient use of market driver information. The presentation details the barriers to expert panel formation, education and effective operation; political issues, concerns of information sharing with competitors, general lack of awareness of the Delphi Technique, scepticism from panel members over likelihood of forecasting success, information overload, limited communication channels, and how they can be overcome. The research centres both on the processes and forecasting outcomes of the Delphi Technique applied to expert panels. The findings suggest that certain recommended features of the Delphi Technique, such as forecasting rounds and groups of five or more experts, may be impractical but that it can still produce effective forecasts when benchmarked against extrapolative, econometric and combined methods.

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Group Decision Making - Face-to-face Meetings, Delphi, and Prediction Markets Compared

Andreas Graefe
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Scott Armstrong
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Information relevant for forecasting or decision-making is often widely dispersed among people, making it hard to retrieve and aggregate it. While organizations most commonly rely on face-to-face meetings to elicit information from groups, it is difficult to find evidence to support the use of this time-consuming and expensive strategy. Instead, meetings often yield to poor decisions and inaccurate forecasts. Evidence suggests that structured approaches of information aggregation allow for better decisions than those derived from meetings. In this paper, we extend prior research by comparing two structured approaches – the Delphi method and prediction markets – to face-to-face meetings. While evidence from the literature favors using Delphi instead of face-to-face meetings, little is known about the relative performance of prediction markets and meetings. Furthermore, we are unaware of any empirical work comparing prediction markets and Delphi and the literature provides no guidelines on when to use the respective approaches. To address this deficit, we conduct laboratory experiments comparing prediction markets, Delphi, and meetings on a performance task. We plan to recruit 180 subjects and randomly assign them to one of the three methods, i.e. for each method we will have 12 groups, each with five subjects. The performance task involves answering 10 almanac questions in two phases: Phase 1, in which subjects work as a group to come up with a solution; and Phase 2, in which they work separately. We will analyze the relative performance of the three approaches and compare the group results with the posterior judgments of the best group members as well as the respective statistical group average. In addition, we will examine the extent to which the approaches generate confidence and satisfaction in the group judgments.

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SEA1

Contributed Session: Seasonality I

Wednesday, 09:20am-10:40am Room: Azur

Chair: Paul J. Fields
Brigham Young University, USA

Estimation of seasonal factors and predictions using fixed seasonal factors and Holt's method

Blyth Archibald
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A common approach to forecasting seasonal time series is: estimate the seasonal factors, use the seasonal factors to seasonally adjust the series, forecast the seasonally adjusted series, use the seasonal factors to re-seasonalize the predictions. The usual technique to estimate the seasonal factors is classical decomposition. We investigate whether a more formal approach to estimating the seasonal factors improves the forecasts when the (fixed) seasonal factors are additive, the level and trend are adaptive (the seasonally adjusted series is modelled by Holt's procedure). This structure allows us to determine the autocorrelation structure of the errors and to use generalized least squares to estimate the seasonal factors. The estimates of the seasonal factors are significantly better than those from the additive equivalent of classical decomposition when tested on simulated series. When the seasonal factors from generalized least squares are used with Holt's procedure on the logarithm of the monthly seasonal series in the M1 competition to produce forecasts, the forecasts are significantly better than those using (additive) seasonal decomposition and Holt's method.

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Seasonal estimation by grouping and shrinkage: theroetical and empirical perspectives

John Boylan
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Huijing Chen
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Miller and Williams showed that gains in forecast accuracy for individual series may be achieved by 'shrinking' seasonal estimates towards a base value (one, in the case of multiplicative seasonal indices). Our own empirical work confirms this finding, based on both Mean Square Error and Mean Absolute Percentage Error measures. Previous work on seasonal shrinkage has used James-Stein and Lemon-Krutchkoff estimation methods. In this paper, an alternative approach is introduced, based on direct minimisation of Mean Square Error. An alternative approach to seasonal estimation is to use a 'grouped' estimate, assuming that a series is a member of a group that is seasonally homogeneous. Our empirical work demonstrates accuracy benefits by using grouped approaches, at least for noisy series that are able to 'borrow strength' from the group as a whole. The two approaches to seasonal estimation, of grouping and shrinkage, have tended to be viewed separately in previous research. In this paper, we show how they may be considered as special cases of a more general linear combination of individual seasonal indices. For an additive seasonal model, analytical expressions for mean error, variance, and Mean Square Error are obtained. This offers the possibility of using a variety of estimation approaches, including Minimum Mean Square Error and Minimum Variance Unbiased Estimators for grouped seasonal series.

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Forecasting time series with multiple seasonal patterns

Madhu Gunasingha, Rob Hyndman
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Time series that exhibit multiple seasonal patterns are a common phenomenon. For instance, daily, weekly and annual patterns are seen in hourly electricity demand data and hourly vehicle counts on a freeway. Daily hospital admissions depict a weekly and an annual pattern. Telephone calls to call centres, requests for cash at ATMs, and accessing computer websites are further examples where multiple seasonal patterns can occur. However, models for dealing with such seasonal patterns are relatively new and are still developing. In this paper, we propose a new state space model for forecasting multiple seasonal patterns. Parameter estimates can be optimized using methods from exponential smoothing. The model provides an alternative to existing methods, and also offers some new features. The model will be illustrated using a range of real time series data.

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Modeling Complex Seasonality Patterns

Paul J. Fields
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In the classic conceptualization of a time series model, the process is thought of as containing four components: level, trend and seasonal components with a random errors component. However, the patterns in the process are often more complex, particularly within the seasonal component. For example, the season pattern could be a combination of repeating patterns with daily, weekly, monthly, quarterly and even annual periods, depending on the nature of the process and the frequency observations are recorded. We apply a polynomial-trigonometric model to describe such complex seasonal patterns using actual time series and compare the results to other modeling methods. We used long time-series so that the complex seasonal patterns were apparent and so there was sufficient data to estimate the model parameters. Long time series were also chosen since it is in long time series that modeling the complex patterns even would be necessary and possible. We used data-splitting to estimate the model, test the model and to predict with the model for each method compared. The time series modeled represented economic data, agricultural data and engineering data as well as data from manufacturing and service industries. We find that for time series with simple seasonal patterns, other techniques out performed the poly-trig model, but for complex seasonal patterns, the poly-trig model performed remarkably well. We also suggest a methodology for computing prediction intervals for the model. We show that the poly-trig model is a straight-forward, intuitively understandable and easily implemented method. We also show that for the types of data we investigated, the poly-trig model should be given strong consideration.

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ENR6

Contributed Session: Energy I

Wednesday, 11:05am-12:05pm Room: Clipper

Chair: Joo Young Jeon
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Forecasting risk and return of photovoltaic investments

Ignacio Mauleón
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The conventional financial measure of the value of an investment is the internal rate of return. Some serious shortcomings of that measure are: A) the proceeds of the investment will have to be reinvested, and the rate at which this can be done, in practice, will have a decisive impact on the return at maturity; two extreme values are the current market rate, and the internal rate of return, presumably higher. This last possibility, however, may be hampered in practice for the lack of investment opportunities -in the Spanish photovoltaic case, because the price of energy is set by the government, outside and above the market price, and this policy can not be expected to last for ever. B) future proceeds are just expected values (wheather and financial volatility), a better approach being to forecast and simulate future incomes, solving the probability distributions of returns. An array of risk-return measures can be defined now drawing on A) and B): 1) market risk measures, aimed at determining the probability that the realized yield of the investment is below given limiting values - for instance, the market rate, zero, or some value in between. 2) credit risk measures - i.e., the expected market value of the investment, conditional on a realized yield below the market rate. All these measures provide more realistic benchmarks to assess the economic value of an investment. Photovoltaic investments in Spain are a case in point, since the internal rate of return is substantially higher than the equivalent market rate. A realistic measure of the economic value of the investment is, therefore, lacking, and specially relevant, since Spain has chosen renewable energies as the alternative to polluting energy sources.

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Analysis of temperature-gas consumption relationships in a regional domain

Emil Pelikan, Marek Brabec, Ondrej Konar, Jiri Vondracek
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Deregulated market in natural gas is more sensitive to temperature-related inputs. This is true both for residential and commercial demand. Deep understanding of relationship between outdoor temperatures and energy consumption on regional level can help decision makers in their forecasting, planning and control. Such information also give statistics useful for estimation of costs or savings incurred due to various anomalous weather and climate patterns. In this contribution, we study the relationship between outdoor temperatures and natural gas consumption data in the West Bohemian region (area of approx. 10,000 km2 with population of 850,000). The temperature dataset contains hourly measurements from 141 stations located across the region. Natural gas consumption data are available at two levels of aggregation: i) as daily consumption totals for the whole region as well as, ii) individual daily consumptions for approx. 100 individual commercial and residential customers. We use spatial-statistical methods for data analysis. In particular, we first use a spatial model from which we can estimate the temperature field. Subsequently, we look at different spatial scales at which to aggregate the estimates to produce consumption estimates/predictions. I.e. more formally, we determine the scale on which to spatially filter temperature data in order to have good grasp of gas consumption dynamics. We discus also importance of other meteorological variables (wind speed and sunshine duration) with respect to the natural gas consumption. The work is supported by the research grant No. 1ET400300513.

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Time series models for wind power quantile forecasting

Joo Young Jeon
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Wind power is the fastest growing source of renewable energy. A consequence of this is that, in recent years, there has been a marked increase in accurate methods for wind power. Although most attention has focused on point forecasting, electricity system operators can benefit greatly from the availability of estimates of the uncertainty in the power generated from each wind farm. This paper is concerned with producing wind power quantile forecasts. We model wind power, rather than wind speed, as this avoids the need to estimate the power curve. In addition to the use of data and forecasts for wind speed and wind direction, our quantile models include time series features based on autoregressive and exponential smoothing ideas. We evaluate the usefulness of the models for prediction from 4 to 72 hours ahead. Data used in the paper corresponds to several Scottish wind farms.

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TSA1

Contributed Session: Time Series Analysis

Wednesday, 11:05am-12:05pm Room: Fregate

Chair: Guillaume Chevillon
ESSEC Business School, France

Inference in Unilateral Spatial Econometric Models

Niklas Ahlgren, Linda Gerkman
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In spatial econometric models dependence between the observations may extend in all directions. The bilateral structure of the process complicates the analysis of asymptotic properties of estimators in spatial econometric models, making it necessary to resort to high-level assumptions guaranteeing that certain convergences hold. Under some relatively mild conditions on the spectral density of the process, the existence of a unilateral autoregressive approximation to a spatial series may be established. The stationarity condition for unilateral spatial autoregressive processes is well known. We consider inference in the spatial autoregressive model when the data are generated by a unilateral spatial autoregressive process of finite order. The estimator of the autoregressive parameter is shown to be consistent and asymptotically normal. Some simulation results to examine the finite sample properties of the estimator show that it is nearly unbiased, except at the boundary of the parameter space. In the nonstationary case the estimator is inconsistent and diverges. An estimate of the spatial autoregressive parameter close to one in absolute value is found to be an indication of nonstationarity. The specification of spatial econometric models is based on the assumption that the elements of the weights matrix are nonstochastic and exogenous to the model. But in many cases in practice, the weights matrix is unknown. We show that underspecifying the weights matrix results in an underestimated spatial autoregressive parameter and overspecifying the weights matrix results in an overestimated spatial autoregressive parameter. Depending on the choice of the weights matrix, a very different picture of the magnitude of spatial autocorrelation in the data may be obtained. An empirical application to house prices in the county of Stockholm, Sweden, is included as an illustration of the findings. A forecasting exercise based on the estimated spatial econometric model is provided as an illustration.

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Non-stationary time series analysis by probabilistic grammar

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A method is presented for extracting characteristic patterns from a time series using its representation by a symbolic time series. A procedure of adding a specific noise is applied to the original time series used as a template. The class of distorted symbolic time series is used to infer a probabilistic grammar. In the paper the conditions imposed to the noise are investigated in order to get a class of new series sufficiently closed to the original template. A classification of the time series is proposed based on the study of the probabilistic grammar rules. Some successfully applications on real non-stationary time series are reported

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Finite Sample Distributions of Estimators and Predictors of Non-stationary Processes

Guillaume Chevillon
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This paper studies the finite sample properties of processes which exhibit both a stochastic and a deterministic trend via local-asymptotics and introduces the concept of a 'weak' trend where the trends have the same order of magnitude and interact at all sample sizes. Here, finite sample parameter estimators and forecast errors are functions of 'drifting' Ornstein-Uhlenbeck processes. In a comparison of direct and iterated multi-step estimation and forecasting of a — potentially misspecified — random walk with drift at short or long horizon, we show, analytically and by simulation that we can account for the non-linear patterns exhibited in finite samples.

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EBC14

Contributed Session: Economic Modelling

Wednesday, 11:05am-12:05pm Room: Le Gallion

Chair: Sophie Bereau
University of Paris 10, France

A mixed normal-asymmetric Laplace model for modelling economic growth

Pär Stockhammar
Stockholm University, Sweden

This paper empirically tests the relevance of a reduced and modified form of the Aghion and Howitt (1992) model for economic growth. The model is based on Schumpeter's idea of creative destruction, i.e. that economic development is determined by the stochastic arrival of innovations, assumed to be Poisson, which in this case signifies the sum of exponentially distributed random numbers. The difference between positive and negative shocks is Laplace-distributed. In order to handle the asymmetry of these shocks, and the background noise, the innovation distribution is modelled as a mixed Normal-Asymmetric-Laplace (NAL) distribution. Estimated NAL distributions closely mimic their observed counterparts, showing that the Schumpeterian model is not contradicted by data. The estimated NAL distribution can be used as the likelihood function in Bayesian distribution forecasting, where the prior could be given by a time series model or it could be purely judgmental.

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Financial liberalization and its implications on MENA Markets

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The aim of our work is to study empirically the impact of regional and international financial integration on macroeconomic volatility in the developing economies of the MENA region over the period of 1980-2006. Simon Neaime (2005) showed that financial openness is associated with an increase in consumption volatility, contrary to the notions of improved international risksharing opportunities through financial integration. His results emphasize the role of sound fiscal and monetary policies in driving macroeconomic volatility. In regard to structural reforms, the development of the domestic financial sector is critical, as a high degree of financial sector development is significantly associated with lower macroeconomic volatility. He argued that enhancing regional financial integration might constitute a venue to circumvent the vulnerability of the small open MENA economies to external shocks, and a mean to enhance consumption smoothing oppprtunities, as well as international financial integration. Our objective is to study the porperties and the characteristics of the MENA stock markets and the prospects and implications of enhanced financial liberalization in the region. It also explores whether these markets can offer international investors unique risk and returns characteristics to diversify international and regional portfolios. Johansen cointegration tests reveal that the GCC equity markets still offer international investors portfolio diversification potentials while other emerging MENA stock markets like those of Turkey,Egypt, Morocco and to a lesser extent Jordan have matured and are now integrated with the world financial markets. Granger causality tests and impulse response functions show that shocks to the US and UK stock markets are transmitted to the MENA region but not to the GCC stock markets. Shocks to the French market insignificantly affect the MENA stock markets.

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Robust Estimations of Equilibrium Exchange Rates within the G20: A panel BEER Approach

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This paper is concerned with the robustness of equilibrium exchange rate estimations based on the BEER approach for a set of both industrial and emerging countries. The robustness is studied in four directions, successively. First, we investigate the impact of using alternative proxies for relative productivity. Second, we analyze the impact of estimating the equilibrium equation on one single panel covering G20 countries, or separately for G7 and non-G7 countries. Third, we measure the influence of the choice of the numeraire on the derivation of bilateral equilibrium rates. Finally, we study the temporal robustness of the estimations by dropping one or two years from the estimation period. Our main conclusion is that BEER estimations are quite robust to these successive tests, although at one point of time misalignments can differ by several percentage points depending on the methodology. The choice of the productivity proxy is the most sensible one, followed by the country sample. In contrast, the choice of the numeraire and the time sample have a relatively limited impact on estimated misalignments.

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DEM1

Contributed Session: Demography

Wednesday, 11:05am-12:05pm Room: Le Mistral

Chair: Roselyne Joyeux
Macquarie University, Australia

Forecasting Migration Flows

Tullio Buccellato, Gary Brown, Julian Chow, Nigel Stuttard
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The enlargement of EU to include Central and Eastern Europe has induced a considerable increase in migration. This in turn has lead to an increased interest in forecasting of migration flows. In the light of the weakness of model based forecasting in dealing with the new characteristics of the East-West migration flows (which tend to be circular and temporary), testing and comparing survey-based techniques has acquired more importance. In this paper we report on a project to conduct a comparative analysis of different forecasting techniques (univariate and multivariate). We discuss the appropriateness of the different forecasting techniques, also taking into account the use of migration theory model-based forecasts.

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Temporal disaggregation and restricted forecasting of population time series

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Eliud Silva, Daniel Pena
Universidad Carlos III de Madrid, Spain

Two situations for combining population time series are considered. Firstly, we use temporal disaggregation to combine census data with vital statistics information in order to estimate annual population data for geographic areas of the Metropolitan Zone of Mexico City. Secondly, we apply multiple restricted forecasting to combine annual disaggregated series with official targets about future population growth rates. Then, a mechanism to evaluate the compatibility of the demographic goals with the annual estimated data is proposed. We conclude that the targets established in the population program are not attainable. Thus, we propose future population growth rates that are compatible with the estimated historical behavior of the population.

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Forecasting Australian passport demand for minors and adults

Roselyne Joyeux, George Milunovich, John Rigg
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Passport applications in most countries have increased dramatically over the last seven years making it difficult for the government agencies responsible for issuing those passports to plan ahead. In this paper we build univariate and multivariate forecasting models for Australian passport applications for minors and adults (including seniors) using an extensive data set from January 1987 to June 2007. We recommend optimal models for given forecasting horizons (e.g. one year versus two years) and analyse economic drivers of passport demand. Specifically we investigate the forecasting performances of the following three types of models: ARIMA and ARIMAX; VECM (with no macroeconomic explanatory variables); VECM with macroeconomic variables specified as exogenous. To select the exogenous variables and the lags, amongst other statistical methods, we employ the general-to-specific (GETS) modelling method. Our main conclusion is that accurate forecasting can be obtained from the models developed in this paper. Our second conclusion and recommendation is that it is best to identify a number of different forecasting horizons, i.e. short-term and long-term, and choose an optimal forecasting model for each horizon, as there is no single best performing model for absolutely all purposes. Specifically, for short-run forecasting (up to a year), the ARIMA and ARIMAX models outperform the other models both for forecasting joint passport demand for adults and senior citizens as well as that for minors. For longer run-forecasting VECM models forecast best for adults and seniors, but minors are still best forecast by an ARIMA or ARIMAX model even in the longer-run.

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FIN2

Contributed Session: Financial Modelling II

Wednesday, 11:05am-12:05pm Room: les Courants

Chair: Serda S. Ozturk
University of Pittsburgh, USA

An Improved Prediction Limit for the Stochastic Volatility Autoregressive Model

Khreshna Syuhada
Institut Teknologi Bandung, Indonesia

The prediction problem for future values of the Stochastic Volatility Autoregressive with order one (SVAR(1)) model is considered. Specifically, we derive the estimative (1-alpha) prediction limit and its (unconditional) coverage probability. Then, the improved (1-alpha) prediction limit is calculated by applying the method of Kabaila and Syuhada. Monte Carlo simulation is carried out to illustrate this method in the context of one-step-ahead prediction for a Gaussian SVAR(1) model.

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Forecasting Inflation Volatility: A Stochastic Volatility Approach

Serda S. Ozturk
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The author uses the Stochastic Volatility (SV) model based on Efficient Importance Sampling (EIS) to estimate and forecast in.ation volatility. Since existing methods for validation of the SV method are not useful for forecasting in.ation, the author proposes a new validation procedure based on the empirical distribution of forecasted errors. Furthermore, the author uses empirical analysis of independent sets of data for Turkey and the United States to demonstrate the success of the SV model based on EIS as a tool for forecasting in.ation volatility. Finally, the author creates 200 .ctitious data sets for each application based on estimated volatility coeffcients and reruns the forecasting procedure. Based on these .ctitious sets Kolmogorov-Smirnov 5% critical values are calculated. In conclusion, comparison of Kolmogorov-Smirnov values of applications with the critical values support the validity of forecasting SV model based on the EIS.

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FS4

Featured Session

Wednesday 12:15pm-1:10pm Room: Baie des Anges

Chair: Geoffrey Allen
University of Massachusetts, Amherst, USA

Understanding and Improving the use of Judgement in Forecasting

Michael Lawrence
University of New South Wales, Sydney, Australia

Researchers' appreciation of the role of judgement in time series forecasting has undergone a significant shift over the last two decades. While it used to be commonplace to warn against its use, it is now recognised to be an indispensible component in most forecasts and much research attention has been devoted to understanding and improving the role it plays. Judgement can be shown to improve most time series forecasts. But at the same time it can be shown to be often biased, inefficient and importantly, significantly influenced environmental and organisational incentives. Furthermore, it is impacted by time series characteristics like seasonality, trend and randomness and by the way forecasting advice (such as from a forecasting support system or from experts or colleagues) is prepared and communicated. This seminar will review the large body of research on understanding and improving the use of judgement in forecasting and highlight some of the research challenges waiting to be addressed.

Michael Lawrence is Emeritus Professor of Information Systems in the Australian School of Business at the University of New South Wales, Sydney, Australia. He has held visiting positions at Lancaster and Bath Universities, England; London Business School and Imperial College, London; Insead, Fontainebleau, France, and University of Maryland, USA. He is past President of the International Institute of Forecasters (IIF), the major professional and academic body committed to improving the state of the art of forecasting, past editor of the International Journal of Forecasting (an Elsevier journal) and served for many years on the Board of Directors of the IIF. He is an associate editor of Managerial and Decision Economics (a Wiley journal), the International Journal of Forecasting and Emeritus Associate Editor of Omega (an Elsevier journal). Before joining the University of New South Wales he worked for eight years in the USA for Ciba-Geigy Corporation and Corning Inc. He has a PhD from the University of California, Berkeley (College of Engineering specialising in Operations Research). His research interests for the last decade have focussed on how to understand and support decision making where a significant component of the decision involves management judgment, with specific interest in understanding and supporting the task of short term forecasting.

HEA1

Contributed Session: Healthcare

Wednesday 12:15pm-01:15pm Room:Clipper

Chair: Robert A. Yaffee
New York University, USA

Functional data forecasting for breast cancer mortality among white and black US women

Farah Yasmeen
Victoria, Australia

Bircan Erbas
La Trobe University, Australia

Rob J Hyndman
Monash University, Australia

The disparity in breast cancer mortality rates among white and black US women is widening, with higher mortality rates among black women. We apply functional time series models on age-specific breast cancer mortality rates for each group of women, and forecast their mortality curves using exponential smoothing state-space models with damping. The data were obtained from the Surveillance, Epidemiology and End Results (SEER) program of the US. We use annual unadjusted breast cancer mortality rates from 1969 to 2004 in 5-year age groups (45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84). Age-specific mortality curves were obtained using nonparametric smoothing methods. The curves are then decomposed using functional principal components and we fit functional time series models with 5 basis functions for each population separately. The curves from each population are forecast along with prediction intervals. Twenty-year forecasts indicate an over-all decline in future breast cancer mortality rates for both groups of women. This decline is steeper among white women aged 55–73 and older black women (60–84). For black women under 55 years of age, the forecast rates are relatively stable indicating no significant change in future breast cancer mortality rates among young black women in the next 20 years.

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State Space Epidemiological Forecasting: A Comparison of Three Models and their Forecasts

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In 1993 in the Southwestern United States, an outbreak of a frequently fatal respiratory disease occurred. The United States Centers for Disease Control and Prevention (CDC) was called in to investigate. They observed early symptoms of fever, headaches, muscle aches, stomach problems, dizziness and chills among those afflicted. Later symptoms were coughing, shortness of breath, pectoral tightness, pulmonary edema and death in about 50% of cases. This disease, found to be caused by a newly discovered hantavirus, was called hantavirus pulmonary syndrome (HPS). Hantaviruses are carried by muroid rodents throughout the world. The most important hantavirus in the United States, the Sin Nombre virus, is carried by *Peromyscus maniculatus* (the deer mouse). If an individual inhales the aerosolized virus from infected mouse urine, saliva, or nesting materials, he may contract HPS. There is no known cure. To assess the longitudinal epidemiological risk of HPS, the CDC, in collaboration with several partners, including Montana Tech University, began trapping mice in the United States. To develop a model to forecast the size of rodent host populations, time series were from the monthly abundance of deer mice on permanent trapping arrays. The findings represent the endeavor to develop and evaluate a deer mouse population size forecasting model in the Northwestern United States from available local weather data. The resulting series contained numerous problems that plague forecasters—such as regime shifts, outliers, and end-effects. Among the various methods applied, the state space method generated some of the most accurate forecasts. This paper presents three versions of the state space model that were applied. Robert A.Yaffee discusses the local level, local level plus interventions, and time-varying parameter weather predictor state space models. The modeling and forecasting accuracy of these state space models is compared and evaluated.

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EXS3

Invited Session: Exponential Smoothing

Wednesday, 12:15pm-01:15pm Room: Fregate

Chair: Keith Ord
Georgetown University, Washington, USA

Non-linear exponential smoothing and positive data

Rob J. Hyndman, Muhammad Akram
Monash University, Australia

Keith Ord
Georgetown University, Washington, USA

Exponential smoothing methods are often used on data that are inherently positive, such as prices, demand, sales, etc. Yet the state space models underlying exponential smoothing usually have the whole real line as their sample space. Some non-linear exponential smoothing models have been proposed to handle positive data, but these can have some undesirable properties. First, the forecast variances may be infinite beyond a certain forecast horizon. Second, some of the data have sample paths which converge to zero almost surely. We explore alternative model specifications, and the resulting forecast distributions. In particular, we derive some results showing subtle differences in long-term behaviour under different distributional assumptions about the errors. The practical implications of these results are considered. We compare some of the possible models using data on the weekly sales of over three hundred items of costume jewelry.

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Extending the normalization of seasonal components to the twenty basic seasonal innovations state space models

Anne B. Koehler
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Rob J. Hyndman
Monash University, Australia

In the exponential smoothing methods, seasonal components are combined with level and trend components to indicate changes to the time series that are caused by seasonal effects. If there are m seasonal components and the components themselves must be reported, it is desirable for these components to be normalized. The seasonal components are normalized when their sum divided by m is 0 for the additive seasonal patterns and 1 for the multiplicative seasonal patterns. For the Holt-Winters additive and multiplicative methods, it has been previously shown that the point forecasts are not affected by the normalization process and the normalized factors can be recovered at any time period. In this presentation, we will show that the prediction intervals are also not altered by normalization, and we will extend the results to eighteen of the twenty basic seasonal innovations (single source of error) state space models. In the two cases where the trend is multiplicative and the seasonal pattern is additive, we show that the seasonal components can be normalized, but the forecasts are affected.

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Density Forecasting of Intraday Call Centre Arrivals using Models Based on Exponential Smoothing

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The operational efficiency of a call centre relies on the accurate density forecasting of the number of calls arriving. Time series of intraday call centre arrivals tend to consist of both intraweek and intraday seasonal cycles. In previous work, we developed an exponential smoothing formulation to accommodate the two seasonal cycles, with the emphasis being on point forecasting. For high volume arrivals series, we formulate the method as a state space model, and use simulation to produce density forecasts. For low volume series, we adapt and extend these models so that they are suitable for Poisson distributed count data. We also consider quantile models with exponential smoothing and autoregressive formulations. These are estimated using quantile regression, and have the appeal of avoiding distributional assumptions. Our empirical analysis evaluates forecasts up to two weeks ahead using data from a large retail bank and NHS Direct, the 24 hour telephone helpline provided by the National Health Service in England and Wales.

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EBC18

Invited Session: Forecasting Macroeconomic Variables with Factor Models

Wednesday, 12:15pm-01:15pm Room: Le Gallion

Chair: António Rua
Banco de Portugal, Lisbon, Portugal

Short-term forecasting of GDP using large data sets: A pseudo real-time forecast evaluation exercise

Gerhard Ruenstler
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António Rua
Banco de Portugal, Lisbon, Portugal

This paper performs a large-scale forecast evaluation exercise to assess the performance of different models for the short-term forecasting of GDP resorting to large data sets from ten European countries. Several versions of factor models are considered and cross-country evidence is provided. The forecasting exercise is performed in a simulated real-time context, which takes account of publication lags in the individual series. In general, we find that factor models perform best and models that exploit monthly information outperform models that use purely quarterly data.However, the improvement over the simpler, quarterly models remains contained.

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Selecting factors in approximate factor models with bootstrap tests

Daniel Grenouilleau
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The paper introduces two bootstrap tests to select factors in approximate factor models, which aim to complement standard information criteria for empirical applications with very large cross-section of noisy data. This research is motivated by the fact that in practice numerous predictors are available with short time-span and yet, extant information criteria typically fail in such setups. Cross-sectional bootstrapping is used to generate empirical distributions for the loadings for a series of interest in the dataset (e.g. that to be forecasted) and for the eigenvalues of the data covariance matrix. A nullity test on the loadings also allows us to identify common factors for a series of interest. Where an eigenvalue is significantly different from the nearest eigenvalues, we reject the hypothesis that the corresponding eigenvector is not a latent factor of the dataset. The tests properties are screened with Monte-Carlo simulations based on data generating processes for static and dynamic factors, that are realistic, i.e. which yields eigenvalues and residuals distributions similar to those of empirical data. Both bootstrap tests outperform extant information criteria where the number of series is far greater than the number of observations, both in Monte-Carlo simulations. In terms of out-of-sample forecasting accuracy, the bootstrap tests also outperform extant tests in a pseudo real-time empirical application using about 2000 series covering the euro area business cycle. As a by-product, the tests suggests that actual data support a hypothesis of pseudo-factor structure, evidenced by the fact that latent factors do not necessarily match the first eigenvalues in a row by decreasing order, but instead should be picked among them.

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Forecasting with targeted combined factors

António Rua, Francisco Dias, Maximiano Pinheiro
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Factor-augmented forecasts have become increasingly popular over the last decade. The simplicity of the diffusion index model of Stock and Watson has certainly contributed to its success among practitioners resulting in a growing body of literature. Nevertheless, two caveats can be pointed out. On the one hand, the ranked factors to be considered in the forecasting model do not depend on the variable to be forecasted and on the other hand, the empirical use of the diffusion index model involves discarding part of the information contained in the dataset. In this paper, we propose a refinement that retains the attractive feature of simplicity while coping with such caveats. The suggested approach is applied to US data and the results are promising as it outperforms the standard diffusion index model in forecasting several major macroeconomic series.

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EBC3

Contributed Session: Consensus Forecasts

Wednesday 12:15pm-01:15pm Room: Le Mistral

Chair: Kajal Lahiri
University at Albany - SUNY, USA

Forecasting the likelihood of a US recession using Oxford Analytica's network of experts

Patrick McSharry
Saïd Business School, Oxford, UK

Mike Wood
Oxford Analytica, Oxford, UK

Unlikely but foreseeable events can have important financial, strategic and political impacts. Oxford Analytica has developed an early warning system called the Global Stress Point Matrix (GSPM) to monitor and forecast such potential events. The system employs Oxford Analytica's global network of experts. Daily briefs provide a high level of transparency to enable users to understand the logic behind the analysts' assessments. The methodology identifies the main factors that could affect each potential event, whether negatively or positively. Through daily updates, the system records increases and decreases in the likelihood of a threat being realised over both a one and five year timescale. We study the likelihood of a deep recession in the US and investigate how this relates to activity in the financial markets as measured by the S&P500 index.

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The Riksbank's Forecasting Performance

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Sweden

This paper describes the official Riksbank forecasts for the period 2000-06. The forecast variables are those that are important for monetary policy analysis, i.e. inflation, GDP, productivity, employment, labour force, unemployment and financial variables such as interest rate and foreign exchange rate. The Riksbank's forecasts are presented and analyzed and compared with alternative forecasts, that is, those from other institutions and simple statistical models. One important message from the study is that macroeconomic forecasts are associated with an appreciable uncertainty; the forecast errors are often sizeable. The forecast memory, defined as how far the forecasts are more informative than the variables unconditional mean, is usually limited to the first year. Furthermore, we find that the inflation forecasts exhibit several appealing features, such as a predictability memory that (possibly) includes the second year, relatively low RMSE and weak efficiency. The forecasts for the investigated real variables are shown to be less precise and they have a shorter forecast memory. The exchange rate predictions demonstrate the least accurate (of the investigated variables) forecasts. Compared to other forecasters, the Riksbank's predictions are often more accurate. This holds for a comparison with the National Institute of Economic Research, even though the differences are statistically insignificant, as well as for a comparison with the participants in the Consensus Forecasts panel, where the Riksbank's predictions often are among the best. We also find indications that misjudgements for productivity growth have had effects on forecasts for both inflation and GDP, but the results suggest that the Riksbank has considered available information in an acceptable fashion. This is also true for the undertaken revisions (from one forecast occasion to another) of the published forecasts.

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Learning and Heterogeneous Expectations: Some Estimates Using Cross-country Surveys

Kajal Lahiri, Xuguang Sheng
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We estimate a Bayesian learning model that explains disagreement among private market forecasters and its evolution over horizons and target years. Forecast disagreement is postulated to have three components due to (i) diversity in initial prior beliefs, (ii) differences in weights attached to priors, and (iii) the differential interpretation of public information. Based on multi-horizon, cross-country and fixed-target survey forecasts of GDP and inflation over 1989-2005, our panel data estimates show that the first component explains nearly 100% to 30% of forecast disagreement, as the horizon decreases from 24 months to 1 month. This finding firmly establishes the role of initial prior beliefs in generating expectation stickiness. We find the second component to have barely any effect on the evolution of the disagreement. Depending on the timing and quality of public information, the importance of the third component increases from almost nothing to 60% as the horizon gets shorter. A panel data analysis of the term structure of forecast errors reveals important information about the effect of unexpected shocks on learning over time and horizons. The distribution of forecast errors changes from being diffused at the beginning to unimodal at the end, with distinct multiple modes in the middle horizons. Using a new test of forecast efficiency developed by Lahiri and Sheng in the context of Bayesian information processing (forthcoming, Journal of Econometrics), we find significant heterogeneity in the nature of inefficiency over horizons and across countries. We also find some interesting differences in the way experts incorporate new information in predicting inflation compared to real GDP, and explore some possible reasons for the differences.

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ICT1

Invited Session: Product Forecasting

Wednesday, 12:15pm-01:15pm Room: Les Courants

Chair: Robert Fildes
Lancaster University, UK

New Forms of Consumer Communication and their Implication for New ICT Product Forecasting

Jessica Hu Tun-I, Robert Fildes
Lancaster University, UK

In many countries voice call volumes have been declining in recent years. In contrast, we also find that people spend increasing amounts of time on the computer to check and send messages through social networks (e.g., Myspace or Facebook) and also through real-time communication software (e.g., Skype or MSN) We conjecture that consumers are transferring to these new channels of communication in order to satisfy their communication needs. The purpose of this research is to categorise the new communication channels that are now available and to analyse the perceived value of the attributes that drive people to adopt them. Importantly this research will address the corresponding substitution effects under different scenarios that will be used in future research to forecast end users' usage pattern. In this presentation we present preliminary results aimed at establishing substitution effects and how this may affect forecasts of usage of these alternative communication channels.

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Diffusion of Innovations in the Swiss Hospitality Industry: State of the Art

Miriam Scaglione, Roland Schegg
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The diffusion of innovations has explained the adoption and use of technologies for over half a century (Rogers, 2003). Developed originally by Rogers in 1962 for the individual adoption of technologies, the theory also applies to organisational adoption of technologies. This research analyses diffusion of innovation by studying the adoption of websites in the Swiss hospitality sector. Two sets of data were used: An early step with websites is registering a domain name (DN), such as accor.com or hyatt.com. This set of data was obtained using a customised software robot (Steiner, 1999) which gathered the registration date, company name and location for all domain names of accommodation enterprises registered in ".ch". In this way, a data base with more than 3'000 hotels was built. A second data set relied upon figures from the Wayback Machine (WM) in the Internet Archive (archive.org), a non-profit organisation that began archiving websites in 1996 (FAQs, 2007). While domain name registration dates suggest when an organisation started to go online (Scaglione et al., 2004a,b), ages available through the WM serve as a proxy for when a website went online (Hashim et al., 2007). Relying upon a coupled Bass and Rogers' diffusion model, the study addresses the following questions: What was the diffusion pattern of domain names in the Swiss hospitality sector? Is there a relationship between website adoption and organisational characteristics such size of enterprise, location or hotel category? Does affiliation play a role in the adoption process; i.e. are there any differences in the diffusion pattern between affiliated and non-affiliated enterprises? Which were the exogenous variables that affected the diffusion process of DN in Swiss hotels: Swiss Market Index (SMI), Consumer Confidence Index (CCI) and Appropriate Moment for Important Acquisition (AMIA) or Gross Domestic Product (GDP)? Are the perceptions and attitudes towards ICT depending on Rogers' adopter categories; i.e. are early-adopters more confident with ICT opportunities and are unafraid about related risk compared to hotels from later adopter categories? An innovation such as the Internet should, following Schumpeter's theory (1947), effecting indicators such as revenue and productivity. The Internet should lower labour, distribution and marketing costs while increasing sales and service quality as well as marketing reach. Has the adoption of a website a ral impact on revenue indicators? Was the Revenue per Available Room (RevPAR) significantly lower before than afte

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Learning effects in sales forecasting - the case of German car manufacturing

Robert Rieg
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Years of improvements in econometric methods, years of practical experience and increasing computing power at always decreasing costs should allow companies to forecast more and more accurately. And with accurate forecasts management would have the prerequisite for preparing realistic plans. Increasingly accurate forecasts should lead to increasingly realistic plans and then to more successful companies. This is especially true for sales forecasts. However, the question "do forecasts become more accurate over time?" was hardly examined in the last decades. In some cases due to a lack of data. In this paper we use data of a large and well-known German car manufacturer. The monthly sales data span 15 years, planned data as well as actual sales volumes for six different countries. Sales volume data include several models of cars which are all produced over these 15 years, yet in different versions (life cycles). It will be shown that there is no overall trend towards more and more accurate forecasts. In some years for some models and in some countries trends to better forecasts are significant but not enduring. Regarding the experience in selling cars for decades, the huge amount of resources, knowledge and methods which include a lot of market information, the ability to use sophisticated time-series analyses, the results of the study are surprising. Possible reasons for forecasting errors include internal ineffective forecasting methods and processes and/or unpredictable external changes. The data suggest that the latter seems more convincing. Further research should broaden the range of industries, products and services to find a more comprehensive picture of learning in corporate forecasting.

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