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# **ISF 2013 PROCEEDINGS**

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## Keynote Speech [ K1 ]

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### Plenary Session:

Monday, June 24, 8:45am-9:45am

Room: Auditorium, Building No.1, 1<sup>st</sup> floor

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**Chair: Mohsen Hamoudia**

France Telecom Group, France

### [EFFECTS OF INDEX-FUND INVESTING ON COMMODITY FUTURES PRICES](#)

**(Clive Granger Memorial Speaker)**

James D. Hamilton, University of California, San Diego, United States

Co-authored with Jing Cynthia Wu

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The last decade brought substantial increased participation in commodity markets by index funds that maintain long positions in the near futures contracts. Policy makers and academic studies have reached sharply different conclusions about the effects of these funds on commodity futures prices. This paper proposes a unifying framework for examining this question, noting that according to a simple model of futures arbitrage, if index-fund buying influences prices by changing the risk premium, then the notional positions of the index investors should help predict excess returns in these contracts. We find no evidence that the positions of traders in agricultural contracts identified by the CFTC as following an index strategy can help predict returns on the near futures contracts. We review evidence that these positions might help predict changes in oil futures prices, and find that while there is some support for this in the earlier data, this appears to be driven by some of the dramatic features of the 2007-2009 recessions, with the relation breaking down out of sample.



**James D. Hamilton** has been Professor in the Economics Department at the University of California at San Diego since 1992, where he also served as department chair from 1999-2002. He had previously taught at the University of Virginia and received a Ph.D. in economics from the University of California at Berkeley in 1983. Professor Hamilton has published articles on a wide range of topics including econometrics, business cycles, monetary policy, and energy markets. His graduate textbook on time series analysis has over 12,000 scholarly citations and has been translated into Chinese, Japanese, and Italian. Academic honors include election as a Fellow of the Econometric Society and Research Associate with the National Bureau of Economic Research. He has been a visiting scholar at the Federal

Reserve Board in Washington, DC, as well as the Federal Reserve Banks of Atlanta, Boston, New York, Richmond, and San Francisco. He has also been a consultant for the National Academy of Sciences, Commodity Futures Trading Commission and the European Central Bank and has testified before the United States Congress.

## Featured Speech [ FS1 ]

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### Featured Session:

Monday, June 24, 10:00am-11:00am

Room: Chey BCD, SUPEX 2<sup>nd</sup> Building, 5<sup>th</sup> floor

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**Chair: Duk B. Jun**

KAIST College of Business, Korea

### **NOT ENOUGH DATA? A PARADOX OF A LARGE CUSTOMER DATABASE**

Makoto Abe, The University of Tokyo, Japan  
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The main interest in economics is to estimate the effect of policy variables on the population as a whole. Heterogeneity is something that causes biases in estimation of aggregate measures (e.g., mean, variance). In Marketing, on the other hand, customer heterogeneity has been the key concept since day one, as characterized by STP (Segmentation, Targeting, and Positioning). In One-to-One Marketing and CRM, Marketers interact with each individual differently. Now, segment of size one is becoming a reality. Recognizing customer heterogeneity, ideally one would like to model consumer behavior at the individual level. However, an individual customer does not generate much transaction data. Even though an immense amount of customer transaction data is collected every day from E-commerce and real stores, suddenly, one is faced with the situation that there is not enough data. This talk will discuss how one can overcome such a paradox.



**Makoto Abe** is Professor of Marketing in the Graduate School of Economics at The University of Tokyo, Japan. Professor Abe obtained his B.S. and M.S. degrees in Electrical Engineering and Computer Science and a PhD in Operations Research all from MIT. His research interests focus on analyzing various marketing phenomena using models at an individual level and deriving managerial implications that are useful for practitioners. In particular, Prof. Abe examines the macro statistics of firms, such as sales and market share, resulting from aggregation of individual consumer purchases. To gain better insights into this process, Professor Abe has carried out research on the micro-level analysis of consumer behavior, either with household-level disaggregate data or by laboratory experiment with a view to understanding the underlying behavior that is responsible for macro-level phenomena. Professor Abe has utilized recent advances in information technology to collect individual data through POS systems and the internet for his research. Taking advantage of the size of disaggregate data, Professor Abe has used nonparametric statistical methods and micro-level simulations to achieve his research goals.

## Energy Forecasting 1 [ EGF1 ]

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### Organized Session:

Monday, June 24, 10:00am-11:00am

Room: 101, SUPEX 2nd Building, 1st floor

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#### Chair: Jooyoung Jeon

University of Bath

#### [MSSA IN THE WIND SPEED FORECASTING](#)

#### Reinaldo Castro Souza

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The so called SSA (Singular Spectrum Analysis) is a procedure that decomposes a univariate time series into a sequence of other time series corresponding to components, such as, trend, seasonal, cycles and residuals. Leaving out these residuals components and adding up the others, a new time series is obtained which is less noisy and, as a consequence, are easier to model and produces more reliable forecasts. This procedure has been used to model univariate brazilian wind speed series, by fitting the PAR(p), periodic autoregressive models, thoroughly used in modelling energy series in Brazil. This paper presents an extension of this decomposition method, by considering its multivariate version known as MSSA (Multi-Channel Singular Spectrum Analysis). The method was applied to a vector of two wind speed series recorded in two locations of the same brazilian northeast region. The obtained results, when compared to the univariate decomposition of each series, were far superior, showing that the intrinsic dependency between the two series were considered by the MSSA decomposition.

## FORECASTING THE EXCEEDANCE PROBABILITY USING ASYMMETRIC LAPLACE MODELS

**James W. Taylor**

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In many applications, a forecast is needed for the probability of a future observation exceeding a given threshold. To estimate the exceedance probability, we introduce a set of autoregressive logit models. These can be estimated by maximising a Bernoulli likelihood. However, this does not account for the extent to which an observation does or does not exceed the threshold. To capture this feature, we propose that the likelihood is based on an asymmetric Laplace (AL) density. It has been shown that, for a fixed probability level and time-varying quantile, maximising an AL likelihood is equivalent to quantile regression. In this paper, we use the AL likelihood for a time-varying probability level and a fixed quantile. We use this new approach to estimate the autoregressive logit models for exceedance probabilities in applications to financial return modeling and wind energy.

## PROBABILISTIC FORECASTING OF WIND POWER USING ADAPTATIONS OF CONDITIONAL KERNEL DENSITY ESTIMATION

**Jooyoung Jeon**

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**James W. Taylor**

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The efficient management of wind farms and electricity systems benefits greatly from accurate density and quantile forecasts for wind power. An approach based on conditional kernel density (CKD) estimation has previously been used to produce wind power density forecasts. The approach is appealing because: it makes no distributional assumption for wind power; it captures the uncertainty in forecasts of wind velocity; it imposes no assumption for the relationship between wind power and wind velocity; and it allows more weight to be put on more recent observations. We propose two adaptations of this approach. First, we consider the situation where a forecast is required for a specific wind power quantile, rather than an estimate of the entire wind power density. Our adaptation involves optimising the CKD-based approach specifically towards estimation of the desired quantile, using the quantile regression objective function. Our second adaptation of the CKD approach incorporates autoregressive modelling which is purely based on the historical wind power observations. In our empirical work, which uses data from European wind farms, we compare the two adaptations of the CKD-based approach with the original CKD-based method and an unconditional kernel density estimator.

## Demography [ DMO ]

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### Organized Session:

Monday, June 24, 10:00am-11:00am

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Juha Alho**

University of Helsinki

### COHORT UNCERTAINTY IN PENSION INSURANCE

**Vesa Ronkainen**

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In this paper we analyze uncertainty that cohorts introduce in pension insurance. In particular we focus on the effects that cohort mortality forecast and small cohorts can have in the context of pension insurance risk management. To this end we review the models that were recently developed in Ronkainen (2012) to address both of these risks, including also a simulation example of pension insurance risk management. We conclude with a brief discussion of other important cohort-based aspects of Asset-Liability Management in pension insurance.

### [FORECASTING REGIONAL INFANT MORTALITY COUNTS: HIERARCHICAL TIME-SERIES APPROACHES](#)

**Han Lin Shang**

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Advances in data collection and storage have facilitated the presence of multiple time series that are hierarchical in structure and clusters of which may be correlated. In many applications, such multiple time series can be disaggregated into many related time series organized in a hierarchical structure based on dimensions, such as gender, geography or product type. This has led to the problem of hierarchical time series modeling and forecasting. We describe several methods for forecasting a hierarchical time series, which provides point forecasts that are aggregated appropriately across different levels of the hierarchy. Illustrated by the regional infant mortality counts in Australia, we investigate the one-step-ahead to ten-steps-ahead point forecast accuracy, and reveal the best hierarchical approach for this example. Furthermore, we introduce a novel methodology for constructing pointwise prediction interval in a hierarchy, and investigate its interval forecast accuracy.

## USE OF TRANSFORMATIONS IN MORTALITY FORECASTING

**Juha Alho**

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Most mortality forecasts are based on trend extrapolation of some transformation of age-specific mortality rates, such as the logarithm or Box-Cox transformation. In many cases, the resulting forecast for life expectancy appears to be biased down, when compared to the long-term trend of life expectancy itself. Alternatively, mortality forecasts can be based on transformations of probabilities of survival. In particular, trend extrapolation after a transformation proposed by Brass seems to lead forecasts that are better in keeping with empirical trend of life expectancy. Theoretical properties of such transformations are discussed and their performance is illustrated with data from Finland.



## Macroeconomics 3 [ MAC3 ]

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### Organized Session:

Monday, June 24, 10:00am-11:00am

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Gian Luigi Mazzi**

Eurostat

### FORECASTING RECESSIONS IN REAL TIME

**Anne Sofie Jore**

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This paper reviews several methods to define and forecast classical business cycle turning points in Norway, a country which does not have an official business cycle indicator. It compares the Bry and Boschan rule (BB), an autoregressive Markov Switching model (MS), and a factor augmented Markov Switching model (FAMS), using several vintages of Norwegian Gross Domestic Product as the business cycle indicator. Timing of the business cycles depends on the vintage and the method used. BB provides the most reliable definition of business cycles. Finally, a forecasting exercise is presented: the BB applied to density forecasts from survey models provides more timely predictions for Norwegian turning points than the Markov Switching models and the BB applied to combinations of density forecasts from a large set of models. This last finding is in contrast to point and density forecast exercises for GDP growth, where the density forecast combination provides the most accurate prediction.

## INSTANT TREND-SEASONAL DECOMPOSITION WITH SPLINES

**Tatyana Krivobokova**

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**Luis Francisco Rosales**

Georg-August-Universitaet Goettingen

We present a nonparametric method to decompose a times series into trend, seasonal and remainder components. This fully data-driven technique is based on penalized splines and makes possible the explicit characterization of the varying seasonality and the correlation in the remainder. The procedure takes advantage of the mixed model representation of penalized splines that allows for the simultaneous estimation of all model parameters from the corresponding likelihood, employing standard software. The approach is fast and efficient, which is confirmed by real and simulated data examples.

## Business Cycles 1 [ BCY1 ]

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### Contributed Session:

Monday, June 24, 10:00am-11:00am

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Antonio Garcia-Ferrer**

Universidad Autónoma de Madrid

### **KEEPING A FINGER ON THE PULSE OF THE ECONOMY: NOWCASTING SWISS GDP IN REAL-TIME SQUARED**

**Boriss Siliverstovs**

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In this paper we put a large-scale dynamic factor model (557 monthly indicators) to a forecasting exercise of quarterly GDP growth in Switzerland in real-time squared. That is, we strictly use only the information that was available to us at a time of making forecasts and we announce our forecasts at the same time we made those. This means that our study reports the results of a genuine ex ante forecasting exercise, where the data-mining for achieving better forecast accuracy ex post is ruled out. The fact that we produce forecasts of quarterly GDP growth at the weekly frequency allows us to continuously monitor the state of the economy and trace the influence of newly released patches of economic data on our forecasts. On basis of this, we were able to capture a phase of economic recovery after the Great Recession, a phase of relatively high growth during the year 2010, and a phase of declining confidence caused by escalating European debt crisis and growing fears of entering a new recession during the evaluation period from 2010Q1 until 2012Q4. The factor model specification follows that of Giannone et al. (2008, JME)

### [AN ONLINE PROCEDURE TO MONITOR LEADING AND COINCIDENT INDICATORS](#)

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**de Juan Aranzazu**

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Based on a new framework for building composite leading and coincident indicators for the Spanish economy using monthly targeted predictors and small scale dynamic factor models we present an online procedure freely available on the web. Our indicator indexes, based on the low-frequency components of a few monthly economic variables, were able to predict the onset of the current Spanish recession, the GDP growth cycles and the classical industrial production cycles, both historically and in real time. Also, our leading indicator provided considerable aid in forecasting annual and quarterly GDP growth rates during the recent recession. Using only real data available at the beginning of each forecast period our indicator one-step ahead forecasts showed substantial improvements over other alternatives. At the time of this writing (16.3.2013), however, neither the coincident or the leading indicators show any sign of recovery of the present recessionary cycle. Green shoots announcements must wait.

## Bayesian Methods [ BYM ]

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### Contributed Session:

Monday, June 24, 10:00am-11:00am

Room: 303, SUPEX 2nd Building, 3rd floor

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**Chair: Boris Choy**

The University of Sydney

### A BAYESIAN APPROACH TO ADAPTING FORECASTS TO STRUCTURAL CHANGES IN A SIMPLE STATE-SPACE MODEL

**Seung Hyun Kim**

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Most forecasting models often fail to produce appropriate forecasts because they are built on the assumption that data is being generated from only one stochastic process. However, in many real world problems, the time series data are generated from one stochastic process initially and then abruptly undergo certain structural changes. In this paper, we assume that the basic underlying process is the simple state-space model with random level and deterministic drift, but is interrupted by three types of exogenous shocks; level shift, drift change, and outlier. A Bayesian procedure to detect, estimate, and adapt to the structural changes is developed and compared to simple, double, and adaptive exponential smoothing using simulated data and the U.S. leading composite index.

### [A BAYESIAN APPROACH TO ARRIVAL RATE FORECASTING FOR INHOMOGENEOUS POISSON PROCESSES FOR MOBILE CALLS](#)

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Mobile call and short message arrivals can be characterized as inhomogeneous Poisson process (IHPP), i.e. a Poisson process with time-varying arrival rate. In this paper we propose a Bayesian framework for the problem of estimating this underlying variable arrival rate  $\lambda(t)$ . Moreover, this variable arrival rate is projected forward in time to provide a forecast for the call arrival rate. The method takes into account continuity and seasonal relations by incorporating them into the prior of the Bayesian formulation. The main contribution is that we obtain an analytical solution for the forecasted rates, in the form of multiple summations, which to our knowledge is the first analytic solution developed for the Bayesian IHPP inference and forecasting problem.

### **BAYESIAN ANALYSIS OF STOCHASTIC VOLATILITY MODEL AND QUANTILE REGRESSION USING ASYMMETRIC LAPLACE ERROR VIA UNIFORM SCALE-MIXTURES**

**Boris Choy**

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This paper proposes a new scale mixture of uniform (SMU) representation for the asymmetric Laplace distribution (ALD). The use of the SMU for a probability distribution is a data augmentation technique that simplifies the Gibbs sampler of the Bayesian Markov chain Monte Carlo algorithms. We consider a stochastic volatility (SV) model with an ALD error distribution. The full conditional distributions for the Gibbs sampler are shown to have closed forms. It is also known that the ALD can be used to obtain the coefficients of quantile regression models. This paper also considers a quantile SV model by fixing the skewness parameter of the ALD at specific quantile level. Simulation study shows that the proposed methodology works well in both SV and quantile SV models using Bayesian approach. In the empirical study, we analyse exchange rate data.

## Econometrics 1 [ ECO1 ]

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### Contributed Session:

Monday, June 24, 10:00am-11:00am

Room: Chey A, SUPEX 2nd Building, 5th floor

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**Chair: Alain Pirotte**

University of Paris II - ERMES

### **HIGH-DIMENSIONAL PANEL ANALYSIS: AN EMPIRICAL ANALYSIS OF STOCK AMREKT**

**Tomohiro Ando**

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This paper considers high-dimensional panel data model in a data-rich environment in which a large number of cross-sectional units and corresponding regressors are available. A crucial point is how to evaluate the goodness of the estimated model. For this purpose, we develop a new model selection criterion from a predictive perspective. Monte Carlo simulation results demonstrate that the proposed method performs well. The effects of the recent subprime financial crisis and the 3/11 earthquake on financial firms listed on the Tokyo Stock Exchange will be reported.



## MULTI-STEP QUANTILE REGRESSION TREE

**Hyun Hak Kim**

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Quantile regression (QR) proposed by Koenker and Bassett [Regression quantiles, *Econometrica* 46(1)(1978), pp. 33–50] is a statistical technique that estimates conditional quantiles. It has been widely studied and applied to economics. Meinshausen [Quantile regression forests, *J. Mach. Learn. Res.* 7 (2006) pp. 983–999] proposed quantile regression forests (QRF), a non-parametric way based on random forest. QRF performs well in terms of prediction accuracy, but it struggles with noisy data sets. This motivates us to propose a multi-step QR tree method using GUIDE (Generalized, Unbiased, Interaction Detection and Estimation) made by Loh [Regression trees with unbiased variable selection and interaction detection, *Statist. Sinica* 12 (2002), pp. 361–386]. Our simulation study shows that the multi-step QR tree performs better than a single tree or QRF especially when it deals with data sets having many irrelevant variables.

## PREDICTION IN AN UNBALANCED SPATIAL NESTED ERROR COMPONENTS PANEL DATA MODEL

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This paper derives the Best Linear Unbiased Predictor (BLUP) for an unbalanced spatial nested error components panel data model. This predictor is useful in many econometric applications that are usually based on unbalanced panel data and exhibit spatial dependence and a nested (hierarchical) structure. For example, predicting house prices within a district including the causes of spatial variations. Using Monte Carlo simulations, we show that this predictor is better in root mean square error performance than the usual fixed, random or nested random effects predictors ignoring the spatial nested structure of the data.

## Finance 5 [ FIN5 ]

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### Contributed Session:

Monday, June 24, 10:00am-11:00am

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Abul Shamsuddin**

University of Newcastle

### **ESTIMATION AND PREDICTION UNDER LOCAL VOLATILITY JUMP DIFFUSION MODEL**

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Various volatility models have been suggested to explain the patterns observed in asset returns. Local volatility models explain the volatility smile phenomenon well in financial markets. However, local volatility models cannot explain jump phenomenon that affects the market. To overcome this limit, a jump diffusion process where the diffusion volatility is the deterministic volatility function of time and the stock price was suggested. Calibration of Jump parameters is ill-posed problem and efficient numerical methods are needed for option pricing. In this research, we propose a calibration method and introduce a second order finite difference method for option pricing under local volatility jump diffusion models. The local volatility jump diffusion models calibrated from the proposed method present better performance than local volatility models and a stochastic volatility model in estimation and prediction of KOSPI200 index option prices.

### **PREDICTIVE REGRESSION: BOOTSTRAP INFERENCE BASED ON A RESTRICTED VAR APPROACH**

**Abul Shamsuddin**

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**Jae H Kim**

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This paper proposes the use of the bootstrap method for statistical inference in predictive regression. The predictive model is estimated and tested in the context of a restricted vector autoregressive (VAR) model where zero restrictions are given to appropriate parameters of the full VAR. The bootstrap is applied to the likelihood ratio (LR) test for the significance of predictive coefficients, based on the feasible generalized least-squares estimation. It is found that the bootstrap LR test shows no size distortion with satisfactory power properties in small samples. The power increases sharply with the sample size, and it is particularly high when the predictor is highly persistent and its error term is highly correlated with that of the predictive regression. As an application, the predictability of U.S. stock return from dividend-yield and interest rate is examined using the bootstrap LR test.

### **PREDICTING COVARIANCE MATRICES WITH FINANCIAL CONDITIONS INDEXES**

**Dick van Dijk**

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We analyze the impact of Financial Conditions Indexes (FCI) on volatility and correlation modeling of daily stock returns of US deposit banks during the period 1994-2011. We proxy the financial conditions by the Bloomberg FCI which comprises the money, bond, and equity markets. Using the Spline-GARCH model for volatilities, we propose a new dynamic correlation model including the Bloomberg FCI and compare this model to the DCC model. We find that worse financial conditions are associated with higher volatility and higher average correlations between stock returns. Especially during crises the additional impact of the FCI indicator is considerable, with an increase in correlations by 0.15. A volatility-timing strategy within the mean-variance framework shows that including the FCI in volatility and correlation modeling increases the annualized portfolio return from 6.8% to 8.9%, with equal portfolio volatilities.

## Forecasting Methods 3 [ FMT3 ]

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### Contributed Session:

Monday, June 24, 10:00am-11:00am

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Artem Prokhorov**

Concordia U/U of Sydney/CIREQ

### **ROBUST AND INVERSE BOOSTING METHODS FOR FORECASTING □ AN EMPIRICAL EVALUATION OF NEURAL NETWORKS FOR PREDICTING TIME SERIES WITH HIGH NOISE AND OUTLIERS**

**Devon Barrow**

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Boosting is a method for model combination based on weighted data resampling. While boosting rarely overfits on low noise data, there is evidence in classification, that it does so for data containing high noise and outliers. Consequently several robust boosting algorithms have been developed in classification and proved successful in improving classification accuracy. In contrast no study investigates explicitly the impact of noise or outliers in boosting time series models, or developed robust alternatives. In this paper we present an analysis of the popular boosting algorithms, AdaBoost.R2 and AdaBoost.RT for time series data containing high noise and outliers. Our analysis draws from the theory on the margins view of boosting using percentage loss rather than margins as in classification. Several novel boosting variants based on existing classification algorithms, AdaboostREG and SmoothBoost are developed for time series. Also Inverse boosting, a novel approach which focuses on ‘easy-to-learn’ examples is introduced. Using artificial neural networks we assess and evaluate the performance of each method on a set of synthetic time series data simulating different noise levels and outliers and on the NN3 competition dataset. Results show that under certain data conditions, boosting outperforms bagging, neural network model averaging and statistical benchmarks.

## GRADIENT BOOSTING FOR MULTI-STEP FORECASTING

**Souhaib Ben Taieb**

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Multi-step forecasting is traditionally handled recursively, where a single time series model is estimated and each forecast is computed using previous forecasts. For non-linear time series, the recursive forecasting strategy is biased. To reduce bias, the direct forecasting strategy involves fitting separate models for each forecast horizon. Recently, the rectify strategy was proposed, combining the best properties of both the recursive and direct forecasting strategies. The rationale behind the rectify strategy is to begin with biased linear recursive forecasts and adjust them with nonlinear direct forecasts so they are unbiased and have smaller error. The advantage of this two-stage process is that it links all the direct forecast models together with the same unifying base model, thus reducing the irregularities that can arise with independent models, and so reducing the forecast variance. We propose to generalize the rectify strategy by allowing the number of rectification steps to be selected automatically in a data-driven manner. To do so, we start with biased linear recursive forecasts as with the rectify strategy and adjust them with direct rectifications models estimated using a gradient boosting approach with univariate and bivariate splines. On the one hand, the strategy avoids considering all possible interactions between the inputs which can be advantageous knowing that we expect many real-world functions to depend on low-order interactions. On the other hand, the use of a gradient boosting algorithm allow us to include variable selection and produce forecasts with good bias and variance properties. The proposed strategy is compared to the recursive, direct and rectify forecasting strategies, both in terms of bias and variance at different forecasting horizons.

## RECONSTRUCTING HIGH DIMENSIONAL DYNAMIC DISTRIBUTIONS FROM DISTRIBUTIONS OF LOWER DIMENSIONS

**Artem Prokhorov**

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**Stanislav Anatolyev**

and

**Renat Khabibullin**

We propose a new sequential procedure for estimating a dynamic joint distribution of a group of assets. The procedure is motivated by the theory of composite likelihood and by the theory of copula functions. We recursively recover  $m$ -variate distributions by coupling univariate distributions with distributions of dimension  $m_1$ . This produces composite maximum likelihood type estimates of the distribution of all pairs, triplets, quadruples, etc, of assets in the group. Eventually the entire dynamic joint distribution for the group can be recovered. Compared to conventional full likelihood based methods, the proposed procedure trades the dimensionality of the parameter space for numerous simpler estimations: even though there are more optimization problems to solve, each is of a much lower dimension than the joint density estimation problem; in addition, the parameterization tends to be much more flexible. Using a GARCH-type application from stock returns, the paper demonstrates how the conventional method fails even for moderately large problems and how the new procedure remains operational and provides reasonable fits as the dimension increases.

## Finance 2 [ FIN2 ]

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### Organized Session:

Monday, June 24, 11:30am-12:30pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Ying Chen**

National University of Singapore

### STATISTICAL INFERENCE USING MAXIMUM-CORRELATION PORTFOLIOS

**Robert Kimmel**

National University of Singapore, Singapore

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We examine theoretical and econometric issues related to linear factor models of expected excess returns. Such models are fundamental in asset pricing theory, and allow forecasting of the mean return of any asset as a linear function of various measures of the asset's risk exposure. Although the econometric theory for such models in which factors are excess returns of traded assets is relatively well-developed, significant gaps remain in the theory for factor models in which the factors are not traded (for example, macroeconomic variables). We therefore examine econometric issues in a formulation of such models where the factors are replaced by their projections on the span of excess returns. Besides providing new asymptotic results, we derive the exact distribution and moments of the estimates of risk premia on maximum-correlation portfolios and related test statistics. A new model selection test statistic is also derived.

### ADAPTIVE DYNAMIC NELSON-SIEGEL MODEL WITH APPLICATIONS

**Ying Chen**

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We propose an Adaptive Dynamic Nelson-Siegel (ADNS) model to adaptively detect parameter changes and forecast the yield curve. The model is simple yet flexible and can be safely applied to both stationary and nonstationary situations with different sources of parameter changes. For the 3- to 12-months ahead out-of-sample forecasts of the US yield curve from 1998:1 to 2010:9, the ADNS model dominates both the popular reduced-form and affine term structure models; compared to random walk prediction, the ADNS steadily reduces the forecast error measurements by between 25 and 60 percent. The locally estimated coefficients and the identified stable subsamples over time align with policy changes and the timing of the recent financial crisis.

## Time Series Methods 1 [ TSM1 ]

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### Organized Session:

Monday, June 24, 11:30am-12:30pm

Room: Chey A, SUPEX 2nd Building, 5th floor

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#### Chair: João Victor Issler

Getulio Vargas Foundation

### MICROFOUNDED FORECASTING

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In this paper, we propose a methodology to investigate large datasets of survey-based forecasts. The idea is to extend the bias-corrected average forecast (BCAF) of Issler & Lima (2009) to consider a varying forecast horizon within a panel-data framework. This approach allows one to estimate individual (and aggregate) forecast bias for several forecast horizons, which are used to construct the forecast error "term-structure" across different horizons. In addition, based on Patton & Timmermann (2007), we relax the standard assumption of optimal forecast under MSE to allow for more general risk functions. In other words, we assume that the conditional expectation might not adequately represent the optimal forecast, for instance, in the presence of an asymmetric risk function. To do so, we modify equation (1) of Issler & Lima (2009) to decompose the individual survey-based forecast as the sum of the conditional expectation, multiplied by a slope coefficient, and the individual time-invariant bias, plus an error term. The objective of such extensions to the BCAF approach is to better understand the dynamics of survey-based forecasts and the related forecast revision process. An empirical exercise with data from a survey of inflation expectations is provided to illustrate the methodology.



### TESTING FOR CAUSALITY AND FORECASTING IN LARGE DIMENSIONAL MIXED FREQUENCY VARS

**Alain Hecq**

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Time series released by statistical offices do not obviously have the same publication frequency. Most national account data (consumption, investment, etc) are available quarterly while business cycle indicators such as the industrial production index, the unemployment rate or the price level are available monthly. Some series are produced weekly (money stock) and many financial variables are usually daily, or even intra daily. A common practice when building a multivariate model using series with different frequencies (e.g., in a VAR) is to aggregate every variable at the low frequency level, hence potentially deleting some important high frequency information. In order keep those data, Ghysels (2012) has introduced an observable mixed frequency VAR framework. This new modelling consists in stacking the low frequency variable with the high frequency series that correspond to that low frequency variable and to estimate a (mixed frequency) VAR. As an example, in Hecq, Goetz and Urbain (2013) we set up a VAR with the quarterly GDP and 3 monthly industrial production variables in a four dimensional VAR system. This new framework can be quite interesting to test for causality between low and high frequency variables as well as for forecasting. However, the issue becomes much more cumbersome when we consider for instance the quarterly GDP and 60 daily interest rates. To this end we propose in this paper to investigate several reduction techniques for this particular big dimensional system. We compare the forecasting performances as well as the results for Granger causality tests of the (i) unrestricted VAR, (ii) the restricted VARX(1) recently proposed by Ghysels, (iii) a system of MIDAS equations and (iv) a reduced rank approach consisting in determining and imposing a few common dynamics generating the system (common cycles). We compare the different approaches both using Monte Carlo simulations and on empirical analyses for the link between business cycle fluctuations and financial market volatilities.

### **FORECASTING BRAZILIAN CONSUMER INFLATION WITH FAVAR MODELS USING TARGETED VARIABLES**

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We compare the predictive accuracy of FAVAR models for forecasting Brazilian consumer inflation (IPCA) where factors are extracted from three different sets of variables in terms of size. The first set is the currently used for forecasting FAVAR models in Central Bank of Brazil and it comprises 43 variables grouped into 6 sectors (economic activity, prices, external, financial, and monetary). The second one is a more comprehensive set that includes more than one hundred series. Then from the second set of variables, following the idea of “targeted predictors” from Bai and Ng (2008) and using the approach proposed by Figueiredo (2010) we reduce the number of variables based on the ability of each variable for forecasting inflation. Our preliminary results show that the FAVAR models obtained from “targeting” the variables present better results.

## Business Cycles 2 [ BCY2 ]

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### Contributed Session:

Monday, June 24, 11:30am-12:30pm

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Eduardo Loria**

UNAM

### **CYCLICAL COMPONENTS AND SIGNALS IN ECONOMIC TIME SERIES: MODELLING, ESTIMATION, AND FORECASTING**

**Thomas Trimbur**

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This paper advances methodology for property-consistent analysis of cyclical components and signals in economic time series and provides analytical formulas for forecasting stochastic cycles of general order. The approach ties together the use of frequency domain perspectives, e.g., business cycle periodicity and band pass filters, with econometric modelling and signal extraction methods. In particular, in a modelling framework, we implement conditions of intermediate frequency in a more direct and plausible manner - by guiding parameters for trend and cycle spectra, rather than emulate a shape of gain for the filter - which should adapt to how the different components relate. To extract cycles and trends in practice, I implement recently developed finite sample matrix formulas for nonstationary signal extraction and compare these with the usual state space recursions. For the special case of the "ideal" filter, I give a model-based representation that has more satisfactory gain properties than the Baxter-King filter and that easily addresses the sample endpoint problem; this form also allows for evaluation of this filter's implicit assumptions about trend-cycle relationships and for generating "ideal filter forecasts". Generally, the preferred gain functions have variable curvature at low and high frequencies that depends on the properties of the input series. The forecast function of the stochastic cycle exhibits clear turning points and may anticipate patterns such as an imminent rise in the intensity, or amplitude, of cyclical movements.

### **MEXICO-US BUSINESS CYCLE SYNCHRONIZATION, 1980.1-2012.4. A STRUCTURAL RELATIONSHIP AND A FORECAST 2013.1-2014.4**

**Eduardo Loria**

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**Emmanuel Salas**

We estimate the structural synchronization of the Mexican business cycle to the US (total and industrial) business cycle for 1980.1-2012.4. We correct the end-of-sample problem inherent to the HP filter with the St-Amant y Van Norden (1997) procedure. By applying the unknown Quandt-Andrews (1993) break-point test, we detect that before 1994.4 there was a weak and negative relationship between the Mexican GDP cycle and the industrial US output cycle; and very weak with the total US GDP's; but since 1997.4 and 2001.2 there is a huge and increasing synchronization ( $R^2=0.96$ ). With the use of a SVAR we forecast that US industrial cycle starts a decreasing stage in 2013.Q1 which in turn is going to cause the same effect on the Mexican economy at least for the next two years.

## Data Mining Prediction [ DMP ]

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### Contributed Session:

Monday, June 24, 11:30am-12:30pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Denis Larocque**

HEC Montreal

### [CLUSTERING TIME SERIES BASED ON FORECAST DISTRIBUTIONS USING KULLBACK-LEIBLER DIVERGENCE](#)

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**David Duling**

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One of the key tasks in time series data mining is to cluster time series. However, traditional clustering methods focus on the similarity of time series patterns in past time periods. In many cases such as retail sales, it would be more useful to cluster based on the future forecast values. In this paper, we show an approach to cluster forecasts or patterns of forecasted time series based on the Kullback-Leibler divergences among the forecast densities. We use the same normality assumption for error terms as used in the calculation of forecast confidence intervals from the forecast model. So the method does not require any additional computation to obtain the forecast densities for the Kullback-Leibler divergences. This makes our approach suitable for mining very large sets of time series. A simulated data and two real data sets are used to evaluate and illustrate our method. It is shown that using the Kullback-Leibler divergence results in better clustering when there is a degree of uncertainty in the forecasts.

### ADOPTION OF BIG DATA ANALYTICS IN TELECOMMUNICATIONS INDUSTRY: THE KOREAN TELCOMS COMPANIES (TELCOS) PERSPECTIVES

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In this paper, we examined the opportunities presented by and potential of Big Data adoption by telecommunications companies (telcos) in the context of subscriber and network data analytics for actionable and business value. Vast amounts of data are readily available to telcos, but the impetus to extract insight and value from this abundant resource is not being utilized. The purpose of this paper is twofold: 1) we aim to explore how telcos can leverage their valuable customer and network data to drive new revenue streams and deliver the best possible customer experience; 2) we will examine how telcos can deal with the escalating impact of disruptive innovation of over-the-top (OTT) players. An inductive content qualitative analysis will be used based on secondary data collection. It is envisaged that the findings would provide guidance and important implications to telcos, regulators, policymakers, vendors, OTT players, researchers, and other stakeholders in the industry. The research is indicative. Further implications of the findings for research and practice would be discussed in subsequent publications. It is a research in progress.

## REGRESSION FORESTS FOR FORECASTING RECURRENT EVENTS

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Processes which generate events repeatedly over time are called recurrent events processes. In many situations, it is important to forecast the number of events that will occur in future time periods. Two examples are the number of warranty claims made by insurance contract holders, and the number of travel rewards made by members of an airline loyalty program. Non-homogeneous Poisson processes (NHPP), for which the rate function varies over time, constitute a class of a very versatile model for modeling recurrent events. The existing tree-based methods for count and Poisson data were developed under the assumption of a constant rate function. We propose tree and random forest methods for NHPP. The proposed tree splitting criterion is based on a model with piecewise constant rate function over pre-specified intervals. The first approach builds a random forest using an aggregation of many trees built with the same intervals. The second approach builds the forest by varying the number, length, and position of the intervals from one tree to another. This produces a smooth estimate of the rate compared to the first approach. The results from a simulation study and an application with data from a loyalty program will be presented.

## Econometrics 2 [ ECO2 ]

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### Contributed Session:

Monday, June 24, 11:30am-12:30pm

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Sungho Park**

Arizona State University

### [SEMI-AUTOMATIC NON-LINEAR MODEL SELECTION](#)

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We consider model selection for non-linear dynamic equations with possible location shifts, applied to re-analyze an empirical model of real wages in the UK over 1860–2004, updated to 2005–2011 for forecast evaluation. After an automatic search over more variables than observations based on a general class of non-linear-in-the-variables functions augmented by impulse-indicator saturation, simplified to a congruent terminal model, an encompassing test can be implemented against an investigator's preferred non-linear function. As that is often a non-linear in the parameters threshold model, the approach can only be semi-automatic.



### **MEASURING THE SKEWNESS AND KURTOSIS IN DISCRETELY OBSERVED NOISY SEMI-MARTINGALE USING HIGH FREQUENCY FINANCIAL DATA**

**Zhi Liu**

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Skewness and kurtosis are important quantities in both Finance and Statistics. However, it is very hard to estimate in finance, in particular, within a long horizon. Recently, Neuberger (2012) proposed an unbiased estimator, but he have not shown the consistency of the estimator, although he argued that the high frequency data is used. The other is proposed by Amaya and Christoffersen (2011), the question is the same, no asymptotic result have been derived. In this study, we first investigate the asymptotic properties of usually used skewness measure as proposed by Amaya and Christoffersen (2011). Based on which, a more reliable estimator was suggested. Moreover, we proposed another estimator which is robust to the microstructure noise, the asymptotic theory have been derived. Simulation example verifies the performance of proposed estimators. Twp estimators were applied to the five-minute and tick-by-tick high frequency financial data to evaluate the skewness and kurtosis, respectively, they display strong forecastibility to the future daily returns.

### **A POTENTIALLY ENDOGENOUS LATENT VARIABLE METHOD FOR REGRESSOR-ERROR DEPENDENCE**

**Sungho Park**

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Instrument-free methods are attractive alternatives to empirical researchers who suffer from the unavailability of good instrumental variables. Instrument-free methods typically decompose an endogenous regressor into a latent variable and a random error (regressor error). The regressor error is assumed to be correlated to the random error in the main regression equation (structural error), generating the endogeneity problem, but the latent variable is assumed to be independent from both the structural error and the regressor error. This is an assumption that is not based on theory or empirical observation. I propose a new approach which relaxes the assumption. A key advantage of the proposed model is that it allows flexible correlations among the latent variable and random errors and thus is free from the misspecification problems due to the ignored correlations. I examine the performance of the proposed approach and serious problems associated with the ignored correlations among the latent variable and the random errors in simulation studies. Using frankfurter sales data from a supermarket chain, I show that the latent variable is correlated with unobserved errors in a sales response model and extant approaches based on the exogeneity of the latent variable result in biases in parameter estimates.

## Energy Forecasting 2 [ EGF2 ]

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### Contributed Session:

Monday, June 24, 11:30am-12:30pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Jairo Cugliari**

INRIA

### [MULTIVARIATE K-NEAREST NEIGHBOUR REGRESSION FOR TIME SERIES DATA - AN EMPIRICAL EVALUATION IN FORECASTING UK ELECTRICITY DEMAND](#)

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The k-nearest neighbour (k-NN) algorithm is one of the most widely used benchmark algorithm in classification, supported by its simplicity and intuitiveness in finding similar instances within the data. In contrast, applications of k-NN in the area of time series forecasting are fewer, and have largely focussed on assessing various distance metrics as similarity measures for identifying similar univariate time series shapes in past data. In particular, k-NN applications in electricity load forecasting were constrained to identifying past realisations of the same dependent variable which match future realisations, in a non-causal approach to forecasting. However, deterministic calendar information on past and future time series motifs is readily available and can be easily incorporated into the forecast to make distinction between load profiles of working days, weekends and bank-holidays. In this paper, we propose a multivariate k-NN technique for forecasting the electricity demand in the UK market which utilises binary dummy variables as a second feature to capture additional information about the day being forecasted. We assess the efficacy of this approach in a robust empirical evaluation using UK electricity load data. The approach shows improvements beyond conventional k-NN approaches and accuracy beyond that of standard benchmark methods.

### **FORECAST OF THE FRENCH ELECTRICITY LOAD USING FUNCTIONAL TIME SERIES**

**Jairo Cugliari**

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The experts at Electricité de France naturally look at electricity demand data as daily curves. Many factors explain the shape of these electricity load curves: meteorological conditions, the position on the year, the type of the day. If we assume that similar past conditions produce similar future conditions, it is reasonable to search for past curves that are similar to the last one observed, and to use their futures to construct the actual prediction. Using a wavelet based dissimilarity measure, we use such a predictor to forecast the daily electricity demand in France for the national operator. The predictor can be viewed as a weighted mean of futures of past curves, where the weights are proportional to the similarity between the actual load curve and the past ones. Our model incorporates a number of corrections that allows it to be used in presence of non stationary patterns such as evolving mean levels. Also a confidence interval is constructed for the prediction using the weights obtained for the predictor.

## Forecasting Methods 4 [ FMT4 ]

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### Contributed Session:

Monday, June 24, 11:30am-12:30pm

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: David Iselin**

ETH Zurich, KOF Swiss Economic Institute

### AN EARLY WARNING SYSTEM FOR FINANCIAL STRESS EVENTS

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The objective of this paper is to propose an operational early warning system that can predict the likelihood of occurrence of high financial stress events. To achieve this goal, the signal extraction approach proposed by Kaminsky, Lizondo and Reinhart (1998) is used to monitor the evolution of a number of economic indicators that tend to exhibit an unusual behavior in the periods preceding a high financial stress event. Based on the individual indicators, we propose three different composite indicators of high financial stress events, the weighted composite indicator, the summed composite indicator, and the extreme composite indicator. In-sample and out-of-sample analysis indicates that the weighted composite indicator has better predictive power than the other two indicators. The weighted composite indicator is then used to predict the probability of the occurrence of a high financial stress event. The analysis of forecasting ability suggests that the weighted composite indicator is a useful diagnostic tool for the likelihood of occurrence of a high financial stress event.

### **AUTOMATIC INFERENCE WITH TEMPORAL REPRESENTATION OF VERBAL FORECASTS EXTRACTED FROM ECONOMIC TEXT CORPORA**

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**Heejin Ro**

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The vast amount of content available on the Internet enables one to automatically extract information such as opinions or sentiments pertaining to an event. It is also possible to locate large quantities of verbal forecasts in various fields (economics, finance, politics, etc.), issued by different sources (experts, politicians, journalists, etc.), in various media (newspaper websites, forum, twitter, etc.). This study focuses on the formal treatment of verbal forecasts extracted automatically from a system of information retrieval. Our focus centers on different formal representations of verbal forecasts, as well as the logical and mathematical tools able to make automatic inferences about these forecasts (temporal logic, dating logic, temporal algebra, etc.). Finally, we present possible inferences based on verbal forecasts, especially examining current cases of undated forecasts in economics textual corpus, i.e., cases in which the speaker of the forecast does not indicate a specific date for the occurrence of an event.

### **USING NEWSPAPERS FOR TRACKING THE BUSINESS CYCLE: A COMPARATIVE STUDY FOR GERMANY AND SWITZERLAND**

**David Iselin**

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We use a simple keyword search in newspaper archives to track the business cycle both in Germany and Switzerland. We show that the inclusion of this keyword searches contributes to more accurate forecasts of GDP growth compared both with auto-regressive benchmark models and leading indicators in Germany and Switzerland.

## Finance 4 [ FIN4 ]

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### Organized Session:

Monday, June 24, 2:00pm-3:00pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Claudio Antonini**

Deloitte

### **EQUITY MARKET REPERCUSSIONS OF LARGE-SCALE FINANCIAL CRIMES AND OTHER DISASTERS**

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Publicly traded corporations can be seen as a directed graph or network with nodes as corporations and edges with weights quantifying return spillovers in terms of forecast error variance decompositions (fevds) of daily returns on their stock prices. Information-theoretic measures can then be used to analyze the flow of information (for example, the detection of a financial crime) through such a network. If there is a shock ("news") to one of the corporations (that is, one node in the network is exposed to a shock), what will be the consequences (in terms of return uncertainty) to the other corporations in the network and to the entire network? We call the level of consequences the "propagation value" of a shock to that corporation. A propagation value can serve as a proxy for investor perception of the infusion of news in the network. The network perspective makes it possible to assess the importance of corporations as news propagators. It also permits an analysis of the stability of a network, and questions of news balance and the "digestion" of news can be discussed. Events, such as financial crimes, hit the network under its current characteristics, have repercussions in the network and distort the current news balance when identified and released to the public. Severe events may even change the network characteristics. We imagine that an "important" (or "less important") corporation will have a high (moderate or low, respectively) propagation value: changes in its stock price is important news and taken very seriously by investors. Great fluctuations in the propagation value of an otherwise big corporation may go along with unstable investor perception. A reputable corporation is associated with a more or less constant, or smoothly changing, propagation value. In this sense, a smooth or even constant

propagation value is a necessary, but not sufficient, criterion for stable reputation. We apply this methodology to networks covering a selection of financial institutions on the one hand, and networks covering international equity markets on the other. Arguing with network characteristics, we show how investor perception of an institution's role in the network may change when hit by a large-scale financial crime or another disaster.

### EXTENDING AND FORECASTING ANTI-MONEY LAUNDERING INDICES THROUGH MULTIPLE IMPUTATIONS

**Claudio Antonini**

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Lack of complete datasets is one of the most pressing problems in dealing with sparsely documented areas such as Anti-Money Laundering. In the social sciences, typically, about 30% of the cases are rejected because of missing data. In the last decade, in order to reconstitute datasets, techniques have been perfected that rely on Bayesian methods, bootstrapping and the EM algorithm. Furthermore, these procedures allow additional data to be used during the imputation process to refine the estimates. They also reduce the bias inherent in traditional methods such "listwise deletion," "hot-" and "cold-deck" imputations, and ad-hoc procedures that replace the missing values by the mean or by neighboring data. We will apply multiple imputation in a multivariable setting to the Basel Institute on Governance AML Index. By incorporating both more complete databases (the World Bank's World Development Indicators) and other indices (IMF's Anti-Money Laundering and Combating the Financing of Terrorism standard index), we can create more comprehensive models, extend the applicability of the index to more countries, and allow it to be used in forecasting. Starting with a reduced AML dataset on 144 countries and 12 indicators, by using another 31 indicators, we will infer data on additional 102 countries and regions of the world.

## Macroeconomics 5 [ MAC5 ]

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### Organized Session:

Monday, June 24, 2:00pm-3:00pm

Room: 101, SUPEX 2nd Building, 1st floor

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#### Chair: Laurent Ferrara

Banque de France

### AN EMPIRICAL ASSESSMENT ABOUT THE NUMBER OF SERIES FOR FACTOR ESTIMATION

#### Pilar Poncela

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When estimating factor models, we have to take into account that factors are unobserved and have to be estimated from observed data. The two most widely used estimators for the common factors are based on principal components and Kalman filter techniques or a combination of both. Consistency results when both the number of series  $N$  as well as the time dimension  $T$  tend to infinity are available. This has provoked, especially when factors are estimated by principal components, that practitioners use all the data they have at hand. However, the additional information content of a new variable about the common factors depends on the variables already in the model. Recent results point out that from an empirical point of view, smaller mean squared forecast errors might be obtained if we do not throw all the data into the model. This paper is devoted to check this conjecture from an empirical point of view using the well-known Stock and Watson's database.



## COMMON FACTORS IN COMMODITY FUTURES CURVES

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This paper examines the comovement of factors driving commodity futures curves. We decompose these curves into level, slope and curvature factors using techniques developed for yield curve modeling, in particular dynamic Nelson-Siegel model. To allow this model to deal with key features of commodity curves, we extend it in two ways: (i) We correct for seasonality to account for the fact that periodic behavior is an important feature of commodity futures prices. (ii) We allow for comovement across commodities by decomposing the factors into a global, sector and idiosyncratic component. Our model has a natural state space representation, so that we may apply the Kalman filter and use time series, cross sectional and term structure information to accurately estimate all parameters as well as the latent factors. In our empirical application we investigate 18 years of data of the 21 most actively traded commodities in the Goldman Sachs Commodity Index. We find that level factors are mostly driven by a global component, while slope and curvature factors comove more due to common sector components. Allowing for time-varying loadings on the global and sector components, comovement appears to vary over time related to the recent financialization of the commodities futures market.

### **POST-RECESSION US EMPLOYMENT THROUGH THE LENS OF A NON-LINEAR OKUN'S LAW**

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EconomiX-CNRS

This paper aims at investigating the relationship between employment and GDP in the United States. We disentangle structural and cyclical employment components by estimating a non-linear Okun's law based on a smooth transition error-correction model that simultaneously accounts for long-term relationships between growth and employment and short-run instability over the business cycle. Our findings based on out-of-sample conditional forecasts show that, since the exit of the 2008-09 recession, US employment is on average 2.7% below its predicted level, meaning that around 3 millions of jobs have been lost from a structural point view.

## Tourism Forecasting 1 [ TOM1 ]

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### Organized Session:

Monday, June 24, 2:00pm-3:00pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Haiyan Song**

The Hong Kong Polytechnic University

### ENHANCING TOURISM FORECASTING PROCESS: A REVIEW OF GOOD PRACTICE

**Tim Quinn**

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Tourist behaviour is heavily dependent on a wide range of factors that can be broadly categorised as demographic, psychographic, economic, and destination specific. As a consequence, it is difficult to forecast demand. Early forecasts were heavily quantitative. While those approaches required human judgment such as choice of data and model structure, additional qualitative dimensions, such as blending model-based forecasts with expert opinion, were soon recognised as necessary to improve accuracy. To improve Australia's official tourism forecasting program, and in order to identify the elements of good practice, a review of forecasting processes that blend quantitative and qualitative process was undertaken seeking opinions from Australian and overseas organisations, tourism and non-tourism. Twenty-seven respected individuals and organisations were identified using a snowballing technique with their opinions sought via online survey or face-to-face. Issues such as frequency of production, accuracy, resources, panels, and managing uncertainty provided the study's foundation. Conclusions are that forecasting processes vary substantially, within and across field of interest. Panels are a fundamental component of good practice but strategically managing those panels is necessary to maximise the flow of information. The paper concludes with practical recommendations to better synthesise quantitative and qualitative information for more accurate forecasts.

### **FORECASTING CITY TOURISM: THE CASE OF VIENNA**

**Egon Smeral**

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City tourism is rapidly gaining in importance as an economic factor. With its fast pace of growth city tourism needs reliable forecasting models to get useful information on demand growth, future room capacity requirements and the price situation to be expected. So far, we have only a handful of studies that look into forecasting issues. They concentrate on the demand side, measuring their findings in terms of arrivals, overnight stays and tourist expenditures. Little research is dedicated to the supply side, especially the mutual influence of demand for overnight stays and bed supply. We need to consider that dynamic demand for overnight stays impacts on occupancy rates and room prices and that these variables in turn influence investment in increasing bed capacities. To fill this gap in research, a simultaneous equation model of the hotel bed supply and the demand for overnight stays on a monthly basis has been developed for Vienna, Austria. Forecasts for 2013 and 2014 have been carried out for overnight stays, bed supply, average daily rates charged for beds and, implicitly, also for occupancy rates.

### **FORECASTING DEMAND FOR HOTEL ROOMS USING DMO'S WEB TRAFFIC DATA**

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This study uses the web traffic volume data of a Destination Marketing Organization (DMO) to predict hotel demand for the destination. The results show a significant improvement in the error reduction of the ARMAX models, compared with their ARMA counterparts, for short-run forecasts of room nights sold when incorporating DMO web traffic data as an explanatory variable. These empirical results demonstrate the significant value of website traffic data in predicting demand for hotel rooms at a destination, and potentially even local businesses' future revenue and performance.

## Commodities Applications 1 [ CMA1 ]

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### Contributed Session:

Monday, June 24, 2:00pm-3:00pm

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Knut Are Aastveit**

Norges Bank

### COMMON FACTORS OF COMMODITY PRICES

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Commodity price fluctuations play an important role in shaping global macroeconomic developments. In this paper, we extract common factors from a large cross-section of commodity prices using the Quasi-Maximum Likelihood method by Doz, Giannone and Reichlin (2012). In doing so, we distinguish between global factors, group specific factors and commodity specific components. We find that the bulk of fluctuations of commodity prices is well summarized by a single global factor. The global factor turns out to have important predictive ability in forecasting commodity prices up to one year horizon in comparison with standard benchmark models.

### OUT-OF-SAMPLE PREDICTABILITY OF OIL PRICES FOR GDP: A MULTI-COUNTRY ANALYSIS

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We study the real-time predictive content of crude oil prices for forecasting real GDP growth. The analysis is applied to both oil exporting and oil importing countries and includes the Euro area, Germany, Japan, Norway, UK and the US. Our empirical application focuses on both point forecasting and density forecasting. In particular, the latter forecasting exercise allows us to investigate whether the large surge in oil prices during the recent decade have had impacts on higher moments of GDP growth, not necessarily reflected in the first moment of GDP growth. Comparing alternative model specifications that include oil prices with a simple univariate benchmark model without oil prices, we find evidence of out-of-sample predictability from oil prices to GDP growth. The predictability is higher for density forecasting than point forecasting, but differences occur between countries, forecast horizons and the choice of benchmark vintage of GDP growth.

## Econometrics 3 [ ECO3 ]

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### Contributed Session:

Monday, June 24, 2:00pm-3:00pm

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Lars-Erik Oller**

Stockholm University

### MACROECONOMIC FORECASTING IN DATA-RICH WORLD: PERSPECTIVES FROM BAYESIAN VARIABLE SELECTION

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Methods for forecasting macroeconomic variables such as GDP growth and inflation rates should exploit the large number of predictors that are becoming increasingly available. One popular approach that does so is motivated by dynamic factor models, and involves using lags of a small number of principal components of all available variables as predictors. We show theoretically and empirically using simulated and real world data that even under if the assumptions of a dynamic factor model hold, forecasts can be improved by augmenting principal components with leading indicators. To address the challenge of judiciously selecting a small number of predictors we employ existing methods of Bayesian variable selection (BVS) based on so called g-priors and also propose our own novel fully Bayesian approach that allows the level of shrinkage to vary with model complexity. The forecasts from all these BVS methodologies are compared using both simulated and real-world data and are competitive when compared to popular benchmarks.

### **DYNAMIC FACTOR MODELS AND REALIZED VOLATILITY: AN APPLICATION TO FORECASTING BOND YIELD DISTRIBUTIONS**

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We present a methodological approach to add realized volatility to level data in estimating a dynamic factor model with stochastic volatility on the transition equations. This allows for a parsimonious joint model of conditional means and volatilities for the purpose of multidimensional density forecasting. We then apply this technique to the forecasting of US government bond yields in the context of a Dynamic Nelson Siegel model with stochastic volatility. Our results show that adding realized volatility data substantially improves both the point and density forecasts over the standard Dynamic Nelson Siegel specifications.

### **WHAT GENERATES ECONOMIC GROWTH?**

**Lars-Erik Oller**

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Josef Shumpeter (1942) suggested that economic growth is generated by innovations. Aghion and Howitt (1992) specify a hypothesis about the causation loop innovations  $\rightarrow$  growth  $\rightarrow$  innovations. This is a study of the distribution function of economic growth. Does it contain traces of a Poisson process, the transfer mechanism, which with no empirical evidence, is put forward in the above book. A new filter is introduced for eliminating heteroskedasticity. And indeed: a mixture of the Normal and a continuous, two-sided Poisson distribution (the Laplace distribution) fits the data best among several alternatives. The stock exchange seems to follow the same distribution. Finally, we give some hints on the role of the stock exchange in the growth process.



## Forecasting Methods 5 [ FMT5 ]

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### Contributed Session:

Monday, June 24, 2:00pm-3:00pm

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Aris Syntetos**

Cardiff University

### [NEW PRODUCT SALES FORECASTING IN THE MOBILE PHONE INDUSTRY: AN EVALUATION OF CURRENT METHODS](#)

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Today's technological development and global competition in markets, requires suppliers of products and services to introduce new products or to improve their current products in order to survive. Fast technological development in the high tech sector also makes this global competition even harder for firms in today's market place, because technology advances have shortened the life cycle for many products. Demand forecasting is crucial for firms operating in this environment who need to make decisions relating to future production capacity, marketing budgets, human resource planning. This is especially true of pre-launch forecasts of demand time series where products have a short life cycle. However, producing such forecasts is a difficult, complex and challenging task mainly because of the unavailability of past data and short life cycles of products. This paper assesses the pros and cons of a range of new product forecasting methods where products have short life cycles. The potential effectiveness of methods such as individual and group management judgments, prediction and preference markets, intention surveys, diffusion models, conjoint analysis, market testing and agent based modelling, are evaluated in the context of the UK mobile phone industry. Areas where there is a need for future research are identified.

### FORECASTING THE BOX OFFICE OF MOTION PICTURES USING SOCIAL NETWORK SERVICE DATA AND AN ENSEMBLE OF MACHINE LEARNING ALGORITHMS

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This paper proposes a novel approach to forecasting the box office of motion pictures using social network service (SNS) data and machine learning-based algorithms. Because of the importance of forecasting in early stages, three sequential forecasting models are developed: (i) prior to release, (ii) a week after release, and (ii) two weeks after release. The total box office is set as the target variable, and informative/emotional mentions and their weekly and overall trends that are collected from various SNS sites are considered as input variables in addition to screening-related information. Four machine learning-based regression algorithms are employed to build forecasting models and the forecasting accuracy is enhanced by constructing ensemble models. Experimental results on 61 motion pictures in the Korean market show that the SNS data noticeably improves the forecasting performance when sufficient data are accumulated, and machine learning algorithms and ensemble models further improve the forecasting accuracy of all three models.

## REPRODUCIBILITY IN FORECASTING RESEARCH

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Replication has been referred to as ‘the ultimate standard by which scientific claims are judged’ and successful replication as ‘the scientific gold standard’. The importance of replication has been stressed across research disciplines and in recent years there have been several developments to support replication in forecasting research as well. Indeed, in its inside cover the International Journal of Forecasting (IJF) states that “It encourages replication studies” and requires that “For empirical studies, the description of the method and the data should be sufficient to allow for replication.” However, whether or not research is truly replicable may not be apparent until a full replication is formally attempted. This paper is about the process of reproducibility in forecasting research. We describe the process where two independent teams of researchers attempted to reproduce the empirical findings of an important study: “Shrinkage estimators of time series seasonal factors and their effect on forecasting accuracy” (Miller and Williams, 2003, IJF). We then identify important issues that arose during the process and discuss how these issues might be resolved so that authors of forecasting studies in the future can ensure the reproducibility of their results.

## Forecasting Practice 1 [ FPC1 ]

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### Contributed Session:

Monday, June 24, 2:00pm-3:00pm

Room: 303, SUPEX 2nd Building, 3rd floor

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**Chair: James Reade**

University of Birmingham

### **PREDICTION BIAS CORRECTION FOR DYNAMIC TERM STRUCTURE MODELS**

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When the yield curve is modelled using an affine factor model, residuals may still contain relevant information and do not adhere to the familiar white noise assumption. This paper proposes a pragmatic way to improve out of sample performance for yield curve forecasting. The proposed adjustment is illustrated via a pseudo out-of-sample forecasting exercise implementing the widely used Dynamic Nelson Siegel model. Large improvement in forecasting performance is achieved throughout the curve for different forecasting horizons. Results are robust to different time periods, as well as to different model specifications.

### **USING INTERNET DATA TO ACCOUNT FOR SPECIAL EVENTS IN ECONOMIC FORECASTING**

**Simeon Vosen**

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Information about special events can improve economic forecasts substantially. However, due to the lack of timely quantitative data about these events, it has been difficult for professional forecasters to utilize such information in their forecasts. This paper investigates whether Internet search data can improve economic predictions in times of special events. An analysis of “cash for clunkers” programs in four selected countries exemplifies that including search query data into statistical forecasting models improves the forecasting performance in almost all cases. However, the challenge to identify irregular events and to find the appropriate time series from Google Insights for search remains.

### DETECTING CORRUPTION IN INTERNATIONAL FOOTBALL

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Corruption is hidden action aimed at influencing the outcome of an event away from its competitive outcome. It is commonly observed in all walks of life yet its hidden nature makes it difficult to detect, yet its distortionary influence on resource allocation ensures the importance of trying to detect it both practically and economically. This paper further develops methods to detect corrupt activity contained in Olmo et al. (2011, *Journal of Banking Finance*) and Reade (2013, *Handbook of Economics of Professional Football*) that make use of different forecasting methods and their processing of information to detect corruption. We collect data from nearly 6,000 international football matches since 2008 in order to assess a claim made in early 2013 by Europol that the outcomes of almost 300 matches between 2009 and 2012 were fixed. Our collected data consists of match outcomes and pre-match bookmaker and betting exchange odds, which we use to explore the divergence between two kinds of forecasts of match outcomes: those by bookmakers, and those constructed by econometric models. We argue that in the absence of corrupt activity to fix outcomes these two forecasts should be indistinguishable, and hence any divergence between the two may be indicative of corrupt activity to fix matches. In the absence of corroborating evidence (which currently is private information in the possession of Europol), we cannot declare any evidence procured in our manner as conclusive regarding the existence or otherwise of corruption, but nonetheless we argue that it is indicative. We conclude that there is mild evidence regarding potentially corrupt outcomes, and we also point towards yet more advanced strategies for its detection.

## Judgmental and Scenario Forecasting 1 [ JSF1 ]

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### Organized Session:

Monday, June 24, 3:10pm-4:10pm

Room: 104, SUPEX 2nd Building, 1st floor

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#### Chair: Dilek Önkal

Bilkent University

### COMPARING INTEGRATION METHODOLOGIES OF HUMAN JUDGMENT AND COMPUTER FORECASTING- A PILOT FIELD STUDY

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Objective: Compare three integration methodologies of human judgment and computer forecasting: combination of inputs, judgmental adjustment, and decomposition of inputs as proposed by Jones (Jones, Wheeler et al. 2006). The effect of judge expertise was also considered. Methods: A field study was conducted with 10 practitioners in a single company in Colombia, for 8 product families during six-months. Volatility at the point was controlled based on average scaled error (ASE) over the naïve forecast. Expertise was measured through a previously developed scale. Results: Results showed no differences in accuracy due to methods, and no differences due to expertise. Accuracy of integration methods was better than naïve, but not better than the computer forecast alone. However, decomposition-compared with judgmental adjustment- led experts to refrain from making adjustments, although size adjustment behavior was not modified.

### PRESUMED VS. EXPERIENCED CREDIBILITY OF THE FORECAST SOURCE

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Throughout the forecasting activities within organizations, externally acquired predictions often go through a review process, resulting in judgmental adjustments by users of these predictions. In this process, the credibility of the source providing external forecasts gains critical importance and contributes to how well these predictions are accepted and the corresponding level of adjustments. This credibility can either be formed by presumptions and/or reputation of the source or it can be formed through experience based on past performance of previously received predictions. This paper reports the results of an experiment that investigates the effects of different types of source credibility on judgmental adjustments of external forecasts. The study utilized a 2x2 design with the factors i) presumed credibility (high vs. low) and ii) experienced credibility (high vs. low) in a stock-price forecasting setting. Findings from this study are discussed and guidance for future research is given.

## Healthcare Forecasting 1 [ HLF1 ]

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### Organized Session:

Monday, June 24, 3:10pm-4:10pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Hans Levenbach**

Delphus, Inc.

### [SURVIVAL DATA MINING FOR BIG DATA - PRACTITIONER'S GUIDE](#)

**Tae Yoon Lee**

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Survival data mining is the application of survival data analysis to data mining problems in a wide area of applications including Healthcare Predictive Analytics. Traditional survival analysis produces the probability of the event at a single point in time. Data mining predefines time windows such as the next one month, 12 months and predicts the likelihood of the event occurring for this single point in time. Survival data mining predicts the likelihood of events occurring in relation to a discrete time interval, such as integer-valued time steps of 1 week, 2 week, 12 months, and so on. It produces a function of the event probability over time so that companies can plan a better longer term strategy based on the expected customer behavior over time. It is not just whether an event will occur in a certain time interval, but also when the next event will occur. This paper presents survival data mining in practice using the new Survival Data Mining node in SAS Enterprise Miner 12.1.



### FORECASTING HEALTH EXPENDITURES: METHODS AND APPLICATIONS TO INTERNATIONAL DATABASES

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Forecast matters and challenges, while hindsight is easy but late. This paper examines issues encountered when using standard health accounts data to forecast health expenditures. It focuses on measurement issues, model specifications, and a comparison of estimates based on data from OECD, WHO, and World Bank. It can inform policy debate on budgetary planning and fiscal sustainability of health expenditure. The analysis compares models estimated with alternative specifications of key variables including logged vs. unlogged, and total vs. per capita. It focuses on three criteria – accuracy, precision, and certainty – to choose from model specifications including univariate (e.g. health spending) and multivariate (e.g. macroeconomic factors), static and dynamic, and single-equation and systems of equations. The results indicate that: 1) expenditure forecasts in logged, total or per capita, and real terms are more accurate than those in unlogged, and nominal measures; 2) other than panels, the smoothing, ARIMA-dynamic, and VAR of health expenditure, income, and demographics alternatively rank as the better model, depending on the data features; 3) the conventional wisdom that sophisticated econometric models predict more accurately, precisely and certainly is not necessarily true. There is a discordance of forecasts from various datasets, which suggests discrepancy among these databases per se.

### PREDICTIVE ANALYTICS FOR HOSPITAL MANAGERS □ A BIG DATA CHALLENGE

**Hans Levenbach**

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Health care entities have at their disposal, industry level transaction data, in many cases superior to those of other industries. However the techniques and analytical capabilities among planners and executives have lagged far behind in making strategic use of these resources in demand forecasting and planning. This represents an opportunity to develop new tools for improving productivity, efficiency and profitability using Big Data with predictive analytics. We will explore some of these challenges in managing what amounts to ‘Big Healthcare Data’ and the necessity to transform such data into forecasts and strategic intelligence. I will discuss the role of predictive analytics in a data-driven decision support environment for hospital management in New York State. We have the SPARCS data information resources available to perform this work, but much more research and experience is needed to effectuate the scope of change needed across the entire US Healthcare Industry.

## Macroeconomics 6 [ MAC6 ]

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### Organized Session:

Monday, June 24, 3:10pm-4:10pm

Room: 101, SUPEX 2nd Building, 1st floor

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#### Chair: Matthieu Lemoine

Banque de France

### **TRANSMISSION OF GOVERNMENT SPENDING SHOCKS IN THE EURO AREA: TIME VARIATION AND DRIVING FORCES**

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This paper applies structural vector autoregressions with time-varying parameters in order to investigate changes in the effects of government spending shocks in the euro area, and the driving forces of those changes. Our contribution is two-fold. First, we present evidence that the short-run impact of government spending shocks on real GDP has increased until the end-1980s but it has decreased thereafter. Moreover, spending multipliers at longer horizons have declined substantially over the period 1980-2008. Second, exploiting state dependency using second-stage inference, we show that these changes can be traced back to increasing availability of credit and larger degrees of trade openness in the euro area, as well as a smaller share of government investment and a larger share of public wages in total spending.

### **A NONCAUSAL AUTOREGRESSIVE MODEL WITH TIME-VARYING PARAMETERS: AN APPLICATION TO U.S. INFLATION**

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**Markku Lanne**

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We propose a noncausal autoregressive (AR) model with time-varying parameters, and apply it to U.S. postwar consumer price inflation. The model is shown to fit the series well, and the results suggest that inflation persistence follows from future expectations rather than dependence on past inflation. Persistence seems to have declined considerably in the early 1980's and slightly increased again in the late 1990's. According to the estimated new Keynesian Phillips curve based on the new model, current inflation is dominated by future expectations, while past inflation plays a minor role. The implied trend inflation estimate evolves smoothly and is well aligned with survey expectations. The time variation of trend inflation seems to follow from the underlying marginal cost variable driving inflation.

### WHICH SIZE AND EVOLUTION OF THE GOVERNMENT EXPENDITURE MULTIPLIER IN FRANCE (1980-2010)?

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The importance of the stimulus packages that were injected in most advanced economies from the start of the financial crisis and the speed at which budgets are now being consolidated in Europe has revived the long-lasting debate on the size of fiscal multipliers. In this study, we focus on government expenditures on goods and services in France. Our conclusion following Blanchard and Perotti (2002) for the identification of government spending shocks is that the multiplier is significant and not far from 1 on impact and becomes statistically insignificant after about 3 years in France. We provide numerous robustness checks concerning the definition of expenditures, assumptions about data stationarity, the role of expectations... Moreover, using a TV-SVAR model, our finding is that the multiplier did not evolve significantly at any horizon since the beginning of the 1980s. The variance of shocks hitting the economy evolves a lot more than model parameters. Even if the priors governing time-variation in the model are more in line with a Markov-switching model, the main evolutions that we uncover are a more aggressive response of monetary policy and a decrease of the expenditure multiplier since the 1990s, but no systematic increase of the multiplier during recessions.

## Commodities Applications 2 [ CMA2 ]

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### Contributed Session:

Monday, June 24, 3:10pm-4:10pm

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Knut Are Aastveit**

Norges Bank

### MACROECONOMIC UNCERTAINTY AND THE IMPACT OF OIL SHOCKS

**Ine Van Robays**

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This paper evaluates whether macroeconomic uncertainty changes the responsiveness of oil prices to shocks in oil demand and supply. Using a threshold VAR model, we identify different regimes of uncertainty in which we estimate the effects of structural oil demand and supply shocks. The results show that higher macroeconomic uncertainty, as measured by higher world industrial production volatility, significantly increases the oil price response to oil demand and supply changes. This implies a lower price elasticity of oil demand and supply in uncertain times, or in other words, that both oil curves become steeper when uncertainty is high. The difference in oil demand elasticities is both statistically and economically meaningful. Accordingly, varying uncertainty about the macroeconomy can explain why the oil price elasticity, and therefore also oil price volatility, changes over time. Also the impact of oil shocks on economic activity appears to be significantly stronger in uncertain times. Among other possible channels, this effect might be explained by irreversibility of investment under uncertainty.

### WHAT DRIVES OIL PRICES? EMERGING VERSUS DEVELOPED ECONOMIES

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This paper explores the role of demand from emerging and developed economies as drivers of the real price of oil. Using a method that allows us to identify and compare demand from different groups of countries across the world, we find that demand from emerging economies (most notably from Asian countries) is more than twice as important as demand from developed countries in accounting for the fluctuations in the real price of oil and in oil production. Furthermore, we find that different geographical regions respond differently to adverse oil market shocks that drive up oil prices, with Europe and North America being more negatively affected than emerging economies in Asia and South America. We demonstrate that this heterogeneity in responses is not only attributable to differences in energy intensity in production across regions but also to degree of openness and the investment share in GDP.

### [ANALYSIS OF MARKETING COMMUNICATIONS MEDIA EFFECTS ON CONSUMER PRODUCT PURCHASE BEHAVIOR](#)

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The 21st century, consumers are always exposed by various marketing communications media such as traditional media like newspaper, magazine, TV as well as new media like internet, IPTV, DMB. Moreover, consumers constantly receive information about products through these marketing communications media. Therefore, effects of marketing communications media on consumers' products purchase behavior is much greater than before, and this effects influence on whole process of consumers' products purchase; need recognition, information search, alternative evaluation, purchase decision, post-purchase behavior. This study analyzes effects of marketing communications media like traditional media; newspaper, magazine, radio, TV as well as new media; internet, DMB, IPTV on consumer product purchase behavior quantitatively, and forecasts which media is preferred by consumers

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in each process of consumer' products purchase according to consumers' characteristic. This study gives implication of corporations' scientific media advertising strategy for targeting and media planning. This study analyzes marketing communications media effects on consumer product purchase behavior quantitatively to use data of Consumer Behavior Survey which Korea Broadcast Advertising Corp (KOBACO) has done annually from 2004 and Multivariate Ordered Probit model.

## Energy Forecasting 3 [ EGF3 ]

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### Contributed Session:

Monday, June 24, 3:10pm-4:10pm

Room: Chey A, SUPEX 2nd Building, 5th floor

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**Chair: Daniele Amberti**

### **ESTIMATION OF PERIODIC AR(P) MODELS USING A NON PARAMETRIC TECHNIQUE**

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The Brazilian energy generation and transmission system is quite peculiar in its dimension and characteristics. As such, it can be considered unique in the world. It is a high dimension hydrothermal system with huge participation of hydro plants. As such, this strong dependency of hydrological regimes implies in uncertainties related to the energetic planning, requiring adequate modeling of the hydrological time series. This is carried out via stochastic simulations of monthly inflow series using the family of periodic autoregressive models; PAR(p), one for each period (month) of the year. In this paper it is shown the problems in fitting these models by the current system, particularly the identification of the autoregressive order “p” and the corresponding parameter estimation. It is followed by a proposal of a new approach to set both, the model order and the parameters estimation of the PAR(p) models, using a non parametric computational technique, known as Bootstrap. This technique allows the estimation of reliable confidence intervals for the model parameters. The obtained results using the model called by PAR(p)-Parsimonious Bootstrap Method of Moments (PBMOM) produced, not only more parsimonious model orders, as well as more robust estimates for the model parameters.



## CONFIDENCE INTERVAL FOR SHORT TERM LOAD FORECASTING

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The goal of this work is to present a statistical methodology to compute confidence intervals for short-term load forecasting. Two approaches are considered to obtain confidence intervals (CI) for load forecast. The first one is based on the calculation of empirical quantiles of relative forecast error observed in the past and the second one use simulation or by block bootstrapping the residuals. In this paper we adopt the block bootstrap approach. Confidence intervals provide a way of quantifying the uncertainty of the forecast. They could be used to assess as precisely as possible the operating margins. All the forecasts are computed making use of the block-bootstrap procedure with 3000 replications (paths). The length of the block is set to 60 observations. The final forecast is the average over the 3000 paths. As the expected frequency is 10%, there is still space for improvement in the construction of the confidence intervals. The volatility of the series is also carefully considered, such that robust confidence intervals are computed. All the modeling cycle is based on rigorous statistical arguments. Our proposal is put into proof with the dataset from electricity utility.

### SEQUENTIAL DESIGN OF EXPERIMENTS FOR MODEL SELECTION: AN APPLICATION TO THE ENERGY SECTOR

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The problem of choosing a good forecasting model, and then estimate its parameters, is well known among forecast practitioners. In the energy sector, a number of models like Linear Models, ARIMA, Generalized Additive Models and Neural Networks have been used to forecast gas consumption or electricity load. The energy sector is of particular interest because of its complex seasonality, the number of predictors involved in the process (e.g. lagged values, calendar effects, weather data and economic cycle) and the high number of time series that have to be forecasted. In this presentation we concentrate on the application of Generalized Additive Models to forecasts in the gas sector and we propose a procedure to search for best forecasting models for a set of similar time series.

## Finance 6 [ FIN6 ]

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### Contributed Session:

Monday, June 24, 3:10pm-4:10pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Jae H Kim**

La Trobe University

### [CONDITIONAL COVARIANCE FORECASTS: EVIDENCE FROM MALAYSIA STOCK MARKET AND FRONTIER MARKETS](#)

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Since the correlations between stock markets are increasing over the time, investors have shifted their focus to frontier markets. Therefore, an accurate forecast of the co-movement between local stock market with frontier markets is of paramount importance. This paper investigates the forecasting performance of various forecasting methods, which consist of conventional models and Multivariate GARCH models, in forecasting the covariance between Malaysia stock markets and frontier markets. Using eight years daily stock indices, we examine both the in-sample and post-sample results of ten forecasting models. The results suggest that CCC-GARCH model outperforms other methods in both in- and post-sample periods. This indicates that constant correlation assumption is hold across local stock market and frontier markets, which is different from the dynamic correlation feature found in developed stock markets in the past literature.

### FACTOR-AUGMENTED GARCH MODEL WITH STRUCTURAL BREAKS FOR FORECASTING VOLATILITY

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Financial data are well known to be subject to structural changes and have international comovement factors among themselves. For factor-augmented models, existing studies usually fix the number of factors and use time-varying parameters to make explanation power higher. However, they may not be able to account for comovement and structural changes. We propose a factor-augmented GARCH model with structural breaks and present an algorithm of model estimation using a Bayesian approach. To obtain the number of factors from data and to estimate effectively structural breaks for GARCH, we employ a fully Bayesian probabilistic PCA and Bayesian inference. using a differential evolution MCMC method. Through the analysis of stock returns and daily exchange rate returns of six nations, we evaluate the impact of breaks and comovement, and compare the performance from pure change-point and recurrent regime specifications. In addition, we provide a treatment to account for the uncertainty in the VaR predictions by garnering empirical posterior distribution information of volatility in out-of-sample.

### **INVESTOR SENTIMENT, IMPLIED VOLATILITY AND THE FAMA-FRENCH FACTOR PREMIA**

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We study the dynamic effects of investor sentiment on the market, size, value, and momentum premia for the U.S. stock market. We employ VAR models in which implied volatility (VIX), investment advisor sentiment, individual investor sentiment, and a factor premium are endogenous variables. The impulse response analysis and test for no Granger-causality are conducted, using the wild bootstrap which provides robust statistical inference under (conditional) heteroskedasticity. The Granger-causality test suggests that the market risk premium is led by sentiment, not the VIX. There is strong evidence of unidirectional causality running from advisor sentiment and the VIX to size premium, implying that size premium results from behavioural biases as well as economic uncertainty. Neither sentiment nor the VIX cause changes to value premium. Momentum premium is driven by the VIX. Impulse response results suggest that individual investors revise their sentiment upward in response to an unexpected upward revision in advisor sentiment but not vice versa, supporting the notion that information transmit from more informed market participants to less informed market participants. Market sentiment and implied volatility go a long way to explain the time-variation in factor premia, which has important implications for cost of capital and asset allocation strategies.

## Forecasting Practice 2 [ FPC2 ]

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### Contributed Session:

Monday, June 24, 3:10pm-4:10pm

Room: 303, SUPEX 2nd Building, 3rd floor

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**Chair: Antonio Aznar**

University of Zaragoza

### **TIME SERIES AND REGRESSION MODELS IN FORECASTING OF REGIONAL INDICES**

**Danila Karbaev**

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This work deals with methods of analysis and forecasting of social and economic regional development. The proposed model was developed to be used in scenario-based forecasting with limited data sets. Forecast dynamics of main indices in medium term based on two scenarios: inertial development and maximization of production. These scenarios are based on formation of the strategic management of the state and change the approach to the mid-term forecasts. Software was developed to create forecasts according to format of the 2P Form of the forecasting model approved by the Ministry of Economic Development of the Russian Federation. One of the functions of the system is to forecast and evaluate the indices of regional socio-economic development. A practical example is given for the two of the leading regions of Russia in comparison with official forecasts and statistical data.

## **CRISIS, MODEL SELECTION AND PREDICTION**

**Antonio Aznar**

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The recent crisis has revived an old tradition in Economics characterised by: First, a certain degree of dissatisfaction with respect to the reliability of the empirical content of economic theories. It is said that the empirical results are not convincing, because they are neither conclusive nor uncontested. Second, a need to consider alternative procedures to discriminate among theories to ameliorate the empirical foundation of theories. In the first part of this paper, I present a brief summary of contributions of some authors within this tradition. Two groups are distinguished. Those in the first group attack the excessive formalism of academic economics. Those in the second group do not critic the level of formalism but the way this formalism has been used. In the second part, I present my own proposal that is a model selection process with three steps: 1. Set of models with empirical convincing results. 2. Set of corroborated models. 3. Ranking of corroborated models.

## **PUTTING THE "M" ARKETING BACK INTO S&OP**

**Charles Chase**

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Aligning the business closely with business financial goals is very important. Integration between S&OP and financial planning is, at most times, redundant and superficial. Rather than planning activities to map to capabilities, the exercise more often focuses around the financial plan and worries about delivery second. It is still a top-down process, where financial plans are converted to unit forecasts that the supply chain seeks to reach. Subsequently, those financial forecasts give little guidance to the supply chain on mix requirements. The problem is further compounded when you look back into the supply chain. To close the commercial and supply chain gap, integration between the financial plan and unit forecasts must be an iterative process through what-if-analysis (demand shaping) exercises, driven by sales and marketing that synchronize unconstrained demand, constrained capacity, and initial financial plans to drive revenue and profitability. This topic based on the author's new book entitled, "Bricks Matter: The Role of Supply Chains in Building Market-Driven Differentiation" will be discussed during this session.

## Time Series Methods 4 [ TSM4 ]

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### Contributed Session:

Monday, June 24, 3:10pm-4:10pm

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Michele A. Trovero**

SAS Institute

### [AUTOREGRESSIVE INTEGRATED MOVING AVERAGE WITH EXPLANATORY VARIABLE \(ARIMAX\) MODEL FOR THAILAND EXPORT](#)

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**Tapanee Kruangpradit**

Thailand Ministry of Commerce

This paper considers a univariate time series model to forecast Thailand exports to major trade partners. The main question is whether the explanatory variable, i.e. trade partners' leading indicator, help improving forecasting performance. Specifically, we compare integrated autoregressive moving average (ARIMA) and ARIMA with explanatory variable. We find that for China, European and the United State, the model with leading indicator outperforms the ARIMA model. Moreover, at the Thailand Ministry of Commerce, the practitioners try to forecast the disaggregated export by commodities then they added those series for the country's export forecast. We called this exercise "indirect" forecast but we suspect that whether this procedure provides more accurate forecast than modeling the aggregate country's export, called "direct" forecast. From our rolling out-of-sample forecasts, we find that the indirect forecasts do not outperform the direct forecasts in all considered trade partners.



## AN INTRODUCTION TO SAS® TIME SERIES STUDIO

### **Michael J. Leonard**

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### **Michele A. Trovero**

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Many organizations collect large amounts of transactional and time series data that are related to their activities. For many analysts, key tasks are understanding the patterns within each time series and the relationships between time series, querying or clustering the data into groups that have similar properties, or searching for similar time series when given a target time series. SAS® Time Series Studio enables you to interactively explore time series data. You can interactively structure the time series data from several different hierarchical and frequency perspectives. You can interactively query (or subset) the time series data by using hierarchical queries, graphical queries, filtering queries, or manual selection. Given a target series, you can interactively search for similar series. After acquiring the time series data of interest, you can analyze the time series data by using common statistical time series analysis techniques for univariate, panel, and multivariate time series data. After you understand the patterns in the selected time series, you can export the data for subsequent analysis such as forecasting, econometric analysis, pricing analysis, risk analysis, time series mining, and other analyses that are related to time series data.

## FORECASTING RATIOS IN HIERARCHIES

### **Michele A. Trovero**

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### **Michael J. Leonard**

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This paper describes how you can use automatic time series model selection techniques to forecast ratios of time series that are organized in a hierarchical fashion. You can use the techniques described in this paper to forecast ratios that are formed by a numerator and denominator series that aggregate to form a hierarchical time series. The goal is to achieve consistent reconciliation of the forecast ratios throughout the hierarchy. This paper demonstrates such a scalable, automated system that uses SAS® High-Performance Forecasting and SAS® Forecast Server.

## Judgmental and Scenario Forecasting 2 [ JSF2 ]

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### Organized Session:

Monday, June 24, 4:30pm-5:30pm

Room: 104, SUPEX 2nd Building, 1st floor

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#### Chair: Dilek Önkal

Bilkent University

### JUDGMENTAL FORECASTING IN TOURISM: EXPERTS' INSIGHTS

#### Shanshan Lin

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#### Haiyan Song

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This study explores the underlying assumptions of tourism forecasting that uses the Delphi approach, and investigates the causes of forecasting bias and inefficiency in judgmental adjustments with a view to gaining useful insights into experts' behaviour in judgmental forecasts. The in-depth interviews show that compared with the academic experts, the industry experts preferred to use much simpler forecasting methods. Both academic and practical experts, however, agreed that it is important to integrate statistical and judgmental forecasts in order to make the tourism forecasts more accurate. A variety of reasons, such as the provision of multiple information cues, the use of web-based forecasting support systems, and the use of the Delphi technique in structuring and aggregating experts' judgments, have been identified as being responsible for the accuracy improvement in tourism forecasting.

### IMPROVING JUDGMENTAL FORECASTING FROM SERIES WITH STRUCTURAL BREAKS

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Though quality of judgmental forecasting for near horizons is often comparable to that of statistical methods (Lawrence et al, 1985), judgmental forecasts are noticeably worse when time series contain structural breaks (O'Connor et al, 1993). We examined forecast accuracy when people forecast from series with and without structural breaks. In some conditions, forecasters explicitly made a decision about whether there was a structural break in the series before making their forecasts; in others, they were aware that structural breaks in the series could occur but made no explicit decision about whether they were present before making their forecasts. As expected from previous work, accuracy was poorer when structural breaks were present and autocorrelation in series improved forecasting but impaired detection of structural breaks. In addition, however, forecasting from series with structural breaks was better when forecasters made an explicit decision about whether the series contained a structural break before they made their forecasts. Explicitly detecting structural breaks may lead to forecasters to take more account of their effects by changing the way that forecasts are produced. Instead of using an intuitive approach based on use of heuristics, forecasters may switch to a more analytic deliberative mode of processing.

## Healthcare Forecasting 2 [ HLF2 ]

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### Organized Session:

Monday, June 24, 4:30pm-5:30pm

Room: 105, SUPEX 2nd Building, 1st floor

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#### Chair: Hyune-Ju Kim

Syracuse University

### ON PREDICTING U.S. CANCER COUNTS

#### H. Hyune-Ju Kim

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We first review recent results published by a group at the National Cancer Institute on predicting US cancer incidence and mortality counts. Methods investigated for a 4-year-ahead projection of cancer counts are summarized presenting the methods recommended by the group. We will also present some details on the Joinpoint method that was recommended for the 4-year-ahead cancer death projection. Then, we propose a model that explains changes in cancer mortality rates as a response to its incidence trend as well as a time trend incurred by other causes. We discuss how to fit this model and how to examine a change in its causal relationship. The method will be applied to several cancer sites to investigate relationships between incidence and mortality trends, and also its efficiency in projecting mortality rates will be discussed. The first part is based on joint work with a group at the National Cancer Institute of U.S., led by Dr. E. J. Feuer, and the second part is based on joint work with B. Cortese at Syracuse University.

### **A Bayesian Adaptive Exponential Smoothing with Application to Cancer Mortality**

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Exponential smoothing methods do not adapt well to unexpected changes in underlying process. Over the past few decades a number of adaptive smoothing models have been proposed which allow for the continuous adjustment of the smoothing constant value in order to provide a much earlier detection of unexpected changes. However, most of previous studies presented ad hoc procedure of adaptive forecasting without any theoretical background. In this paper, we propose a new adaptive exponential smoothing method based on Bayesian statistical theory. With Holt's linear method, we derive slope change detection statistics, and present a procedure to test for the occurrence of a structural change and to modify the forecast. At each time point, we calculate the posterior probability of change and compare it with the critical value to reject the null hypothesis of no slope change. Based on the test result, we decide to change the smoothing parameter or not at each time point. The proposed procedure is compared with previous adaptive forecasting models using simulated data and SEER time series data

### FORECASTING INDIVIDUAL SURVIVAL TIMES FOR CANCER PATIENTS

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#### **Duk Bin Jun**

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This study suggests a model to forecast individual survival times with diagnosis record. The data is retrieved from the Surveillance, Epidemiology, and End Results (SEER) database of the National Cancer Institute. It consists of demographic variables such as age, gender, race, and registries and incidence-related variables such as a diagnosis year, survival time, and tumor progression. Lung and bronchus cancer, primary cancer in the United States is used for our study. Since some subjects have censored survival times, they are decomposed into two groups as of follow-up cutoff date. The first group is comprised of subjects who have survival time records before the date and the second group consists of those who are not dead within the observation period. Our analysis shows that patients who are at diagnosis later or relatively younger are expected to survive for a longer period, whereas those who are female tend to survive for a shorter period rather than male. Using these results, we calculate the individuals' survival probability at each year so that we can derive annual cancer deaths. The proposed model is beneficial to construct the government's budget into health and welfare as well as to predict the demand for cancer insurance industry.

## Macroeconomics 7 [ MAC7 ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Jong-Min Kim**

U of Minnesota at Morris

### ESTIMATING GVAR WEIGHT MATRICES

**Marco Gross**

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This paper aims to illustrate how weight matrices that are needed to construct foreign variable vectors in Global Vector Autoregressive (GVAR) models can be estimated jointly with the GVAR's parameters. An application to real GDP and consumption expenditure price inflation as well as a controlled Monte Carlo simulation serve to highlight that 1) In the application at hand, the estimated weights differ for some countries significantly from trade-based ones that are traditionally employed in that context; 2) misspecified weights might bias the GVAR estimate and therefore distort its dynamics; 3) using estimated GVAR weights instead of trade-based ones (to the extent that they differ and the latter bias the global model estimates) shall enhance the out-of-sample forecast performance of the GVAR. Devising a method for estimating GVAR weights is particularly useful for contexts in which it is not obvious how weights could otherwise be constructed from data.

### HOW FREQUENTLY SHOULD WE RE-ESTIMATE DSGE MODELS?

**Marcin Kolasa**

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Dynamic stochastic general equilibrium (DSGE) models are currently the workhorse framework in macroeconomic analyses and forecasting. Since a full estimation of medium or large DSGE models can be time-consuming, a common practice used e.g. by central banks is to re-estimate them only occasionally rather than during each forecasting round. In this paper we ask how such a practice affects the accuracy of DSGE model-based forecasts. To this end we use a canonical medium-sized DSGE model and compare how its quarterly real-time forecasts for the US economy vary with the interval between consecutive re-estimations, focusing on three standard macroeconomic categories (output, inflation and the short-term interest rate). We find that updating the model parameters only once a year does not lead to any significant deterioration in the accuracy of point forecasts. On the other hand, there are some gains from increasing the frequency of re-estimation if one is interested in the quality of density forecasts.



### CAUSALITY ANALYSIS OF OIL AND STOCK MARKET BY ASYMMETRIC COPULA GARCH MODELS

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#### **Sun Young Hwang**

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This study begins by using univariate GARCH models and the tail dependence by copula models to explore the leverage and asymmetric effects between WTI oil prices in the U.S.A and S&P 500 prices. The causal relationship between the S&P 500 and WTI oil prices was investigated by asymmetric copula GARCH models. Our empirical evidence shows that an asymmetric co-integration relationship exists between the S&P 500 and oil prices. In addition, both the asymmetric copula GARCH models and the Granger causality Wald test confirmed the unidirectional relationship from the oil price to the S&P 500 price. Moreover, the spillover effect of the S&P 500 and oil prices was investigated by the likelihood ratio test from the BEKK representation of Multivariate GARCH model. The contribution of this study might be in that the causality analysis of the asymmetric copula GARCH model is well suited to describing the relationship between the WTI oil prices and S&P 500 prices in the U.S.A. For studying both threshold effect and bilinear structure of asymmetric GARCH regression models with S&P 500 given that oil prices, Asymmetric GARCH processes featuring both threshold effect and bilinear structure have been used.

## Exponential Smoothing [ EXS ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Nikolaos Kourentzes**

Lancaster University Management School

### [IMPROVING FORECASTING BY ESTIMATING TIME SERIES COMPONENTS ACROSS MULTIPLE FREQUENCIES](#)

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Identifying the appropriate time series model to achieve good forecasting accuracy and bias is not straightforward. We propose a novel algorithm that aims to mitigate the importance of model selection, while increasing accuracy. From the original time series, using temporal aggregation, multiple time series are constructed. These derivative series highlight different aspects of the original data, as temporal aggregation helps in strengthening or attenuating the signals of different time series components. In each series the appropriate exponential smoothing method is fitted and its respective time series components are forecasted. Subsequently, the time series components from each aggregation level are combined, and then used to construct the final forecast. This approach achieves better estimation of the different time series components, through temporal aggregation and mitigates the importance of model selection through forecast combination. Empirical evaluation of the proposed framework demonstrates significant improvements in forecasting accuracy and bias, especially for long-term forecasts.

### MODELING AND FORECASTING VOLATILITY OF CRUDE OIL USING SMOOTH TRANSITION EXPONENTIAL SMOOTHING

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Forecasting volatility of crude oil accurately has becoming challenging when the markets are trending unify into global markets consequence upon booming of international trade and information technology revolution. The challenge is intensified by the increasing interconnection between oil and financial markets. This paper introduced a recently developed forecasting method namely Smooth Transition Exponential Smoothing (STES) to improve the predictive accuracy in crude oil markets. This method forecasts the volatility by allowing the smoothing parameters to vary over time as a logistic function of user-specified variables, in order to adapt to changes in the characteristics of the time series. This paper study four issues: firstly, to evaluate the forecasting performance of STES in crude oil markets, to estimate the weekly volatility by using weekly and daily data, to use realized variance as a proxy for actual variance in the parameter optimization and forecasts evaluation, and lastly to assess the present of gold, S&P 500 and USD index in improving the accuracy of weekly volatility forecasts in crude oil markets. The performance of STES is justified by compare against GARCH model and its variants.

## Finance 7 [ FIN7 ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Fuchun Li**

Bank of Canada

### **EARLY WARNING INDICATORS OF MACROPRUDENTIAL DISTRESS IN POLAND**

**Marcin Lupinski**

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Two waves of the last financial crisis (2007-2009 and 2011-2012 respectively) revealed inadequacy of micro-level financial systems supervision. Presence of systemic risk and bilateral dependencies between financial and macroeconomic environment required new approach to financial systems stability management: macro-level regulations and macroprudential policy. This new kind of policy demanded appropriate analytical tools, which can provide input variables supporting decisions in mentioned area. One of the main goals of these tools was to forecast further shocks affecting financial system combining signals coming both from macroeconomic and financial environment. This paper is aimed at presentation of early warning indicators used for monitoring and forecasting threats to Polish banking sector macrostability. Two main solutions were applied here: composite indicators and scenarios generators approach. Broad spectrum of econometric methods was used by the author to estimate mentioned indicators and prepare scenarios of further situation development: dynamic factor models (DFM) with mixed frequencies and missing observation handling, univariate and multivariate Markov switching models, MIDAS models and DSGE analytical structures with embedded financial market and banking sector. The paper is organized as follows. The first part describes general idea of macroprudential policy and application of early warning indicators. The second section is devoted to description of econometric models used to compute proposed indicators. The next part presents data used to construct composite indicators and generate scenarios of further situation development and introduces reader to the problem of models estimation. In the fifth section results of estimated early warning indicators application to Polish banking sector macrostability analysis are discussed. The last section concludes.

### **SUPPORT VECTOR REGRESSION FOR FINANCIAL FORECASTING: A STUDY OF VARIOUS KERNELS**

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**Robert Smith**

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There has been much research in recent years applying regression based support vector machines for forecasting financial time series. Common among nearly all papers within this field is the default use of the Gaussian radial basis function (RBF) kernel. We address this default assumption by undertaking an empirical evaluation of ten kernels encompassing a wide spectrum of properties on six financial contracts. We compare the statistical and economic performances of each kernel by forecasting daily closing prices for 2006 and 2010. The support vector regression model is found to be a weak forecaster of the empirical price, irrespective of the kernel selection, but a strong forecaster of the directional change in price, with the results suggesting several alternative kernel's to the RBF kernel. Within an academic environment, the results suggest a good consistent level of profitability though kernel correlation is observed at times.

### **A MACRO STRESS TEST MODEL OF THE DEFAULT RISK OF CANADIAN BANKING SECTOR**

**Fuchun Li**

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This paper proposes a framework for stress testing the default risk of Canadian banking sector to macroeconomic and financial market shocks. The framework consists of two parts. In the first part of this framework, we adopt a threshold vector autoregression to model the linkages between financial stress condition and macroeconomic variables in which a regime change occurs if financial stress conditions cross a critical threshold. In the second part of this framework, we model the probability of default for Canadian banking sector as depending linearly on its lags and on the key macro-financial variables. We examine the questions such as: can the economy be characterized by low and high financial stress regimes? Do macro-financial shocks have the same effect on the default risk of Canadian banking sector in low and high financial stress regimes? The empirical findings reveal that the Canadian economy fluctuates between a normal regime, in which financial stress is low and economic activity is high, and a stressed regime, in which financial stress is high and economic activity is low. Further more, macro-stress testing results display that macro-financial shocks have stronger effects on the default risk of Canadian banking sector when the economy is initially in the high financial stress regime than in the low financial stress regime. This result suggests that policymakers need to be aware of the possibility that financial stress conditions influence the effects of macro-financial shocks, and policymakers need to monitor financial stress conditions closely.

## Forecasting Practice 3 [ FPC3 ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: 303, SUPEX 2nd Building, 3rd floor

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#### Chair: Michele Hibon

Department of Statistics, Instituto Tecnológico Autónomo de México (ITAM)

### NEW PRODUCT FORECASTING AND INVENTORY PLANNING USING TIME SERIES CLUSTERING

#### Michele Hibon

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New product forecasting is a prerequisite for operational decisions in production and inventory management. With no historic demand data, traditional statistical forecasting methods cannot be employed and new product forecasting is left to the judgment of human experts. With some industries introducing thousands of new products multiple times per year, analytical methods to forecast new products are needed. This paper proposes a methodology of time series clustering and similarity search for analytical, data driven and fully automatic new product forecasting by analogies; designed to construct launch profiles from past product launches data, it utilizes increasing sources of information including product features before launch, recalibrated by using initial orders during launch and early sales observations past launch. The method provides forecasts for new products and empirical quantiles which are used to derive safety stocks. Its promising performance is illustrated in an empirical evaluation using real data from the textile industry.

### ANALYSIS OF THE PREDICTIVE ABILITY OF MEXICO'S MANUFACTURING BUSINESS OPINION SURVEY

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We present an analysis of the data generated by the Manufacturing Business Opinion Survey carried out by Mexico's national statistical agency. First, we describe the survey, including its most relevant indices and employ exploratory statistical analyses based on coincidences and cross-correlations. Then, we present some forecasting models for the indices of industrial production and global economic activity, including opinion indicators as predictors as well as lags of the quantitative variable, so that the net contribution of the opinion indicators can be best appreciated in a forecasting experiment. Since the survey includes numerical opinion questions, we extend the analysis to validate the predictive ability of their corresponding responses as well. Our results lend empirical support to the intuition that this survey provides information that anticipate the behavior of important macroeconomic variables, thus helping analysts of the state of the economy to carry out a more informed conjuncture analysis.



## Transportation [ TPT ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Jaewon Lim**

University of Nevada, Las Vegas

### SHORT TERM FORECASTING OF FLIGHT ARRIVING TIME

**Myung Suk Kim**

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In this study, we suggest various methodologies to provide short term forecasting of flight arriving time. Air flights arriving at Denver International Airport from various US cities in the year 2010 are implemented for the model estimation, and those from the year 2011 are applied to the forecasting. Forecasting proceeds at the time point when a flight takes off from a departing airport. At this time point, important information such as the departure delay time can be obtained and utilized as a predictor. Prediction models, including linear regression, quantile regression, skew t regression, and nonparametric additive techniques, are applied and compared. We also provide a method of computing the probability of flight arriving time by fitting the skew t distribution to the residuals of the models. Our empirical results indicate that the departure delay time, scheduled airborne time, airlines, and weather conditions significantly help to improve the forecasting accuracy, alongside seasonal variables. Among the models, the spline smoothing based nonparametric additive model tended to provide relatively good prediction performances.

### **JOINT DETERMINATION OF MIGRATION AND COMMUTING: FORECASTING INTER-COUNTY MIGRATION AND COMMUTING PATTERNS IN CALIFORNIA**

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Matrix forecasting has become an integral part of a wide range of analyses that lead to a more complete understanding of complex system behaviors, including dynamic relationships among multiple sectors (e.g., input-output matrix, representing inter-industry linkages through supply chains) and the transformation of a system from one state to another (e.g., Markov chain matrix, showing land use conversion over a period of time). This study presents an application of the matrix forecasting methods to the investigation of migration and commuting patterns that are highly interconnected, but often analyzed separately. More specifically, using recent inter-county migration and commuting pattern data for the state of California, it examines if a unified framework, in which migration and commuting flow matrices are jointly determined, can improve the forecasting performance. It is found that a higher accuracy can be attained by joint forecasting compared to the two separate projections, although the forecasting performance varies by the method employed.

## Time Series Methods 5 [ TSM5 ]

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### Contributed Session:

Monday, June 24, 4:30pm-5:30pm

Room: Chey A, SUPEX 2nd Building, 5th floor

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#### Chair: Henghsiu Tsai

Institute of Statistical Science, Academia Sinica

### FORECASTING TOURISM DEMAND IN GREECE WITH SINGULAR SPECTRUM ANALYSIS

#### Christina Beneki

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Greece has suffered an unprecedentedly deep recession in the last five years, in combination with abnormally high uncertainty concerning its fiscal and financial stability. The Greek tourism sector represents one of the main pillars of the country's economy. Tourism is the country's largest contributor and among the highest in the world. Although rather seriously hit, the tourism market performed better than other service markets, giving a base for the easier and faster recovery of the sector. The main objective of this paper is, therefore, to examine whether there will be recovery of tourism demand, being the first sign of a much sought recovery of the economy as a whole. To this end, we use univariate singular spectrum analysis for forecasting the number of inbound tourists and the travel receipts in Greece by country of origin. We also evaluate different SSA forecasting algorithms.

### **NON-LINEAR AUTOREGRESSIVE MODELS WITH TIME-VARYING COEFFICIENTS AND VOLATILITY FOR MINIMUM TEMPERATURE WITH APPLICATIONS IN AGRORISK ANALYSIS**

**Reza Hosseini**

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This work develops a statistical model for minimum temperature in order to assess the frost risk in Agricultural regions. These models can be used to estimate the probability that: a frost happens in a given time-period in the year; a frost happens after 10 warm days in the growing season etc. These probability estimates then can be used for: (1) assessing the agroclimate risk of investing in this industry; (2) pricing of weather derivatives. Non-linear autoregressive models with time-varying coefficients and volatility with various seasonal components and lags are compared using AIC. The optimal model is a time-varying autoregressive model which includes non-linear terms. These models are then used to simulate future weather from which the probabilities of appropriate hazard events for pistachio yield are estimated.

### INFERENCE OF SEASONAL LONG-MEMORY TIME SERIES WITH MEASUREMENT ERROR

**Henghsiu Tsai**

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**Edward Meng-Hua Lin**

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We consider the Whittle likelihood estimation of Seasonal Autoregressive Fractionally Integrated Moving Average (SARFIMA) models in the presence of an additional measurement error, and show that the spectral maximum Whittle likelihood estimator is asymptotically normal. We illustrate by simulation that ignoring measurement errors may result in incorrect inference. Hence, it is pertinent to test for the presence of measurement errors, which we do by developing a likelihood ratio (LR) test within the framework of Whittle likelihood. We derive the non-standard asymptotic null distribution of this LR test. Since in practice we do not know the order of the SARFIMA model, we consider three modifications of the LR test that take model uncertainty into account. We study the finite sample properties of the size and the power of the LR test and its modifications. The efficacy of the proposed approach is illustrated by a real-life example.

## Keynote Speech [ K2 ]

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### Plenary Session:

Tuesday, June 25, 8:30am-9:30am

Room: Auditorium, Building No.1, 1<sup>st</sup> floor

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**Chair: Robert Fildes**

Lancaster University, United Kingdom

### **FORECASTING SALES: MODELS, MANAGERS AND THEIR INTERACTIONS**

Philip Hans Franses, Erasmus University Rotterdam, Netherlands  
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Many globally operating companies rely on a forecast support system (FSS) to automatically create short- and long-horizon sales forecasts across products and countries. Often, such an FSS amounts to a sophisticated business analytical tool as monthly forecasts are automatically updated once new sales figures (and perhaps other relevant variables) become available, and also, many such systems allow for monthly updates of model creation. Even though an FSS is recommended by many as a desirable business analytical tool, many companies do allow the managers, who are responsible for local sales targets and also for shipping and planning, to pair these forecasts from an FSS with their own forecasts. Recently, various databases with FSS model forecasts, managers' forecasts and realizations became available, and allowed for an analysis of the quality of the forecasts and for suggestions for improvement of the managers' forecasts. In this presentation I will review some of the recent evidence and I will provide avenues for fruitful further research.



**Philip Hans Franses** is Professor of Applied Econometrics and marketing research at the Erasmus School of Economics (ESE). Professor Franses has been consistently ranked among the top economists in the Netherlands since 1998 by the high-profile ranking Dutch Economists Top 40. His articles and books have contributed to the internationalization of econometrics in the Netherlands and to the establishment of the Erasmus School of Economics' Econometric Institute. Professor Franses' research interests span a number of different areas, in particular the development of new models that enable more accurate forecasts with a specific focus on seasonal time series and marketing metrics. His interests also include economic growth and business cycles as well as the Euro. Professor Franses' research aims to address practical questions with answers substantiated by modern econometric models – models often newly developed by him and his team. His articles have appeared in all the leading scientific journals and books as well as in national and international mainstream media. He regularly takes part in the Dutch BNR news radio panel. Companies and institutions throughout the Netherlands and abroad have regularly recruited him as an advisor on a range of issues. Professor Franses was elected in 2011 as member of the Royal Netherlands Academy of Arts and Sciences. In 2012 he received an honorary doctorate from Chiang Mai University in Thailand.

## Featured Speech [ FS2 ]

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### Featured Session:

Tuesday, June 25, 9:40am-10:40am

Room: Chey BCD, SUPEX 2<sup>nd</sup> Building, 5<sup>th</sup> floor

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**Chair: Sungho Park**

Arizona State University, USA

### **OPTIMAL SAMPLING NETWORK FOR NEW PRODUCT TEST MARKETING**

Inseong Song \*, Seoul National University, Korea

Hongsuk Yang, Seoul National University, Korea

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The development of new products is crucial for a business to maintain its competitive advantages, but the introduction of new products is risky. To avoid huge losses from launching unsuccessful products, marketers try to test the market potential of a new product in the early stages of the development process. Similarly, it is not uncommon for a multistore retail chain to test the potential profitability of a new product in a few selected stores before it introduces the product to the entire chain. Since test marketing would involve huge costs, marketers need to find a better way to select markets for testing while keeping the number of test markets as low as possible. This study proposes a model to develop an optimal sampling network with which one can identify the optimal combination of markets for test marketing. Based on a simple demand model, an approach to find an optimal sampling network that would lead to a minimum variance of the estimate of the market size of a new product is developed. It is also demonstrated that the samples based on the proposed procedure produces a much more accurate estimate of the market size for a new product than randomly chosen samples do.



**Inseong Song** is Associate Professor of Marketing at SNU Business School. Prior to joining SNU in 2010, he was an associate professor at Hong Kong University of Science and Technology where he was substantiated (tenured) in 2008. He has a BBA degree from Seoul National University, a MS in management science from Korea Advanced Institute of Science and Technology, and a PhD in business from The University of Chicago. Dr Song's research focuses mainly on consumer purchase behaviors and firms' competitive marketing strategies including pricing and new product introduction. His research utilizes mostly structural econometric modeling approaches. His articles have appeared in top marketing journals such as the Journal of Marketing Research, Management Science, and Quantitative Marketing and Economics. Dr Song has taught undergraduate and postgraduate courses on Marketing Management, Marketing Research, Pricing and Promotion Strategies, and Quantitative Marketing Models.

He has also taught Marketing Strategy and Competitive Marketing in executive programs. He was a recipient of Franklin Prize of Teaching Excellence from HKUST Business School in 2003.

## Keynote Speech [ K3 ]

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### Plenary Session:

Tuesday, June 25, 2:00pm-3:00pm

Room: Auditorium, Building No.1, 1<sup>st</sup> floor

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**Chair: Paul Goodwin**

University of Bath, United Kingdom

#### [FORECASTING WITHOUT FORECASTERS](#)

Rob J. Hyndman, Monash University, Australia  
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Many applications require a large number of time series to be forecast completely automatically. For example, manufacturing companies often require weekly forecasts of demand for thousands of products at dozens of locations in order to plan distribution and maintain suitable inventory stocks. In population forecasting, there are often a few hundred time series to be forecast, representing various components that make up the population dynamics. In these circumstances, it is not feasible for time series models to be developed for each series by an experienced statistician. Instead, an automatic forecasting algorithm is required. I will describe some algorithms for automatically forecasting various types of time series, including:

- univariate non-seasonal time series;
- univariate seasonal time series;
- univariate time series with multiple seasonality;
- multivariate time series;
- functional time series;
- hierarchical time series.

In addition to providing automatic forecasts when required, these algorithms also provide high quality benchmarks that can be used when developing more specific and specialized forecasting models. All the methods described are freely available in R packages.



**Rob J. Hyndman** is Professor of Statistics in the Department of Econometrics and Business Statistics. His academic qualifications include a Bachelor of Science (Honors) and a Ph.D. from the University of Melbourne. He is an accredited statistician with the Statistical Society of Australia. Professor Hyndman has researched and consulted with a wide range of business, industry and government clients. His most recent work includes demand forecasting for the electricity industry, estimating life expectancy for the Australian indigenous population, and forecasting the national health budget. He has held academic positions at Monash University, the University of Melbourne, Australian National University and Colorado State University. He is currently a director of the International Institute of Forecasters, editor-in-chief of International Journal of Forecasting and director of the Business and

Economic Forecasting Unit in the Department of Econometrics and Business Statistics at Monash University. He is an elected member of the International Statistical Institute and a member of the International Institute of Forecasters, International Association for Statistical Computing, Institute of Mathematical Statistics, American Statistical Association and the Statistical Society of Australia. Professor Hyndman has received several awards for his research including the 2007 Moran Medal from the Australian Academy of Science. He has also been a recipient of the Dean's Award for excellence in innovation and external collaboration (2010), the HP Innovation Research Award (2010), the Vice Chancellor's Award for Postgraduate Supervision (2008) and the Dean's award for excellence in research (2008). Professor Hyndman's research interests include forecasting, time series analysis, statistical computing, and computational demography.



## Finance 1 [ FIN1 ]

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### Organized Session:

Tuesday, June 25, 9:40am-10:40am

Room: Chey A, SUPEX 2nd Building, 5th floor

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#### Chair: Ying Chen

National University of Singapore

### INTRA-DAY LEADS AND LAGS BETWEEN STOCK RETURNS EMPIRICAL MOMENTS AND OPTION IMPLIED MOMENTS

#### Kian Guan Lim

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#### Chaoran Song

There is a new literature on using risk-neutral moments implied from traded options to predict future returns of the underlying stocks. The mathematical techniques for implying out such moments are contained in Bakshi, Kapadia, and Madan (2003). Conrad et.al. (2013) uses cross-sectional regressions to establish some predictability of future returns using ex-ante implied skewness. However, all the existing studies used daily end-of-day options data. In reality, there exists intraday options data as well as intraday high-frequency underlying stock data. The market microstructures of underlying stocks and their derivative options may be complex and feedbacks cannot be ruled out. It is thus interesting to examine the lead-lag patterns of risk-neutral versus empirical moments and their probability distributions. The results will not only have interesting implications for trading, but will have important lessons for regulators to consider trading rules in high-frequency huge volume trades. Statistical techniques studying such lead-lag relationships involving up to 4 moments and their corresponding distributions will be employed in the forecasting and regression analyses.

### **LOCAL ADAPTIVE MULTIPLICATIVE ERROR MODELS FOR HIGH-FREQUENCY FORECASTS**

**Andrija Mihoci**

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We propose a local adaptive multiplicative error model (MEM) accommodating timevarying parameters. MEM parameters are adaptively estimated based on a sequential testing procedure. A data-driven optimal length of local windows is selected, yielding adaptive forecasts at each point in time. Analyzing one-minute cumulative trading volumes of five large NASDAQ stocks in 2008, we show that local windows of approximately 3 to 4 hours are reasonable to capture parameter variations while balancing modelling bias and estimation (in)efficiency. In forecasting, the proposed adaptive approach significantly outperforms a MEM where local estimation windows are fixed on an ad hoc basis.

**Macroeconomics 1 [ MAC1 ]**

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**Organized Session:**

Tuesday, June 25, 9:40am-10:40am

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Ana Beatriz Galvao**

University of London

**A MEDIUM SIZE FACTOR MODEL TO ESTIMATE EURO AREA AND MEMBER COUNTRIES MONTHLY INDICATORS OF ECONOMIC ACTIVITY**

**Rosa Ruggeri Cannata**

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The paper presents an enhanced version of a large scale factor model aiming at estimating monthly indicators of economic activity for the euro area and its largest member countries. Those indicators can be considered as proxies of gross domestic product. In this model, single factor coincident indicators, like in Stock and Watson, are combined with temporal disaggregation techniques, to deal with missing data, and with univariate and multivariate techniques to ensure temporal and sectoral consistency. To obtain monthly indicators of economic activity, monthly output and expenditure side components of the gross domestic product are estimated and then aggregated to produce output and expenditure based GDP estimates, which are then combined by means of a weighted average. The structure of the factor matrix, the loading mechanism as well as the strategy to exploit co-movements properties into the model, are presented in details. The estimation procedure is also discussed, stressing the importance of achieving computational efficiency, which is crucial due to the model dimension. Finally, the model is compared in real-time with EuroMIND, the euro area monthly indicator of economic activity, which is regularly produced since several years.

### [ANTICIPATING EUROSTAT ESTIMATES OF EMPLOYMENT FOR THE EURO AREA](#)

**Claudia Cicconi**

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This paper proposes an early estimate of the employment of the euro area, released by Eurostat with a delay of 75 days with respect to the reference quarter. The proposed early estimate is obtained by using a data set of monthly and quarterly indicators directly related to employment consisting of both aggregate and country-level data. The estimates are derived from a dynamic factor model allowing for mixed-frequency data, missing observations at the beginning of the sample and ragged edges due to non synchronous data releases. The accuracy of the estimate is evaluated by means of a (pseudo) real-time out-of-sample exercise that simulates the actual availability of the indicators on the basis of the release calendar observed during the first quarter of 2012. Our early estimate is characterized by a mean square forecast error 50 per cent lower than the benchmark autoregressive estimate and by a mean absolute forecast error as low as 0.1.

### [GLOBAL ECONOMIC FORECAST TO 2050](#)

**Yamasawa Nariyasu**

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I conduct a GDP forecast to 2050 for about 10 countries in the world. The countries are United States, China, India, Brazil, Russia, Japan and so on. Methodology is a basic production function approach. I forecast each countries labor force, capital stock and TFP. I also tried some simulations about Japanese economy. In base line case, Japan's GDP will decrease by 0.5% per year. But if we activate women's labor force, GDP growth rate increase by 0.5% per year. If we activate old people labor force, the growth rate go up by 0.3%. If we activate foreign workers, the growth rate go up by 0.2%. I also some simulations about an increase of inbound investment and a rise of TFP( Total Factor Productivity).

## Telecommunications 1 [ TEC1 ]

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### Organized Session:

Tuesday, June 25, 9:40am-10:40am

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Mohsen Hamoudia**

France Telecom Group, France

### [A SCENARIO-BASED FORECASTING OF MULTI-MODAL DATA TRAFFICS IN AN N-SCREEN ENVIRONMENT](#)

**Suk-Gwon Chang**

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As smart-devices proliferate and hop more frequently across different access points of 3G W-CDMA, 4G LTE and a variety of proprietary wireless extensions of fixed Internet, it's becoming more and more difficult to set up profound measures of heterogeneous network capacity provisioning requirements, making a large network investment or upgrade decision tougher and riskier ever than before. This situation is likely to become worse as we deploy a wide variety of B2B and B2C cloud services and M2M applications. Motivated from these prospects, this paper formulates a multi-modal data traffic forecasting problem and incorporates it into a comprehensive scenario analysis for the period of 2011 to 2016. ICT ecosystem dynamics are analyzed using an influence diagram and converted into a 2x2 ICT ecosystem scenarios. Investigated are eight different networks which deliver heterogeneous data traffic among TV, Smart TV, PC, smart pad, cellular phone, smart phone, and M2M terminals. Finally, strategic implications of the scenario analysis are discussed to validate the practicality of this approach.

### INTERNET CONNECTIVITY WARS: THE IMPACT OF MUTUAL TRUST AND PROVIDERS ASYMMETRY

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**Alessio D'Ignazio**

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Recent studies on the evolution of the Internet ( See Dhamdhere, and Dovrolis, "Twelve Years in the Evolution of the Internet Ecosystem," Networking, IEEE/ACM Transactions, 2011) found evidence of cycles in connectivity between operators. In this paper, we use a repeated game setting to explain these cycles as resulting from the imperfect ability of Internet connectivity Providers to monitor their Customers' actions. In equilibrium Providers introduce temporary spells of disconnection, to reduce their Customers' incentives to free ride on connectivity. We estimate two econometric models focussing both on the probability and on the length of these punishment phases, both necessary elements to ensure that connectivity, although discontinuously, remains a feature of the Internet ecosystem. We find that asymmetry between Customer and Providers, shaping the Customers' period incentives to deviate, and the history of past connectivity, affecting mutual trust and information asymmetries, are the main factors in determining both the length and the probability of the occurrence of the disconnection phases and, consequently, the evolution of the Internet connectivity.

## Combined Forecasting 1 [ CBF1 ]

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### Contributed Session:

Tuesday, June 25, 9:40am-10:40am

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Roland Martin**

SAP AG

### **COMBINING VOLATILITY FORECASTS USING DISCOUNTED LEAST SQUARES AND SMOOTH TRANSITION METHODS**

**Wei Chong Choo**

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**James W. Taylor**

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Even though there is some literature regarding the application of combining methods to volatility forecasting, most of the combining methods employ fixed combining weights. However, some researchers have argued that the combining weights should be allowed to change over time in order to adapt to the changing relative superiority of the forecasts. Considerable attention has been given to combining forecasts of the level of a series. By contrast, combining volatility predictions is far less common. In this paper, we propose two new approaches to combine volatility forecasts from a time series model with option-implied volatility. The first approach is time varying discounted weighted least square (DWLS) method. The second approach is smooth transition (ST) combining, which allows the combining weights to change gradually and smoothly over time in response to changes in suitably chosen appropriate transition variables. Several transition variables are considered, including the size and sign of the previous period's shock, and also the trading volume. We evaluate the forecast accuracy of individual methods and combinations using stock index data. Of the individual methods, the most accurate were the GJRGARCH model and implied volatility. Combinations of these two methods led to improved accuracy, with the smooth transition combining method providing a competitive set of forecasts. Interestingly, we found some evidence for the use of the trading volume as a transition variable. However, the performance of the newly proposed time-varying DWLS combining method, which allows the parameter to change over time, is not as good as we had hoped.

### OUTPERFORMING IMF FORECASTS BY THE USE OF LEADING INDICATORS - EVIDENCE FOR COUNTRY AGGREGATES –

#### **Katja Drechsel**

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#### **Axel Lindner**

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In this study we analyze the performance of World Economic Outlook (WEO) forecasts by the IMF for the total world and the countries aggregates of both the advanced economies and the emerging and developing economies. With a focus on the forecast for the next and the current year, we find that the forecasts improve substantially with decreasing forecast horizon. The use of leading indicators has been favored during the last decades to improve economic forecasts for the near future. Many papers have discussed the performance of leading indicator forecasts in particular during the financial crisis and the effects of pooling leading indicator forecasts. However, all these studies consider either individual countries, typically the US or Germany, or predefined aggregates, e.g. euro area. But none of the studies has focused on broader country groups. Therefore, we have identified leading indicators for each country group that might improve the IMF forecasts for these areas. Some simple single-indicator forecasts on the basis of data that are available at higher frequency outperform the IMF forecast substantially, especially in the first months of the current year, but in some cases also for the next year.

### FORECAST COMBINATION EVALUATION IN RETAIL

#### **Roland Martin**

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Combining different forecasts is a promising way to produce more robust and correct forecasts. The hope is that significant characteristics in a time series are “highlighted” by the different models while outlier behavior of one model is dampened by the combination of the models. In this talk we want to investigate the power of forecast combination in a retail fresh item scenario using real-world data. We will investigate whether a combination can outperform a pre-chosen best-of-breed model, what characteristics the models to combine should be capable of and what effects this has on the forecast quality, using retail KPIs.



## Demand Forecasting 1 [ DEM1 ]

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### Contributed Session:

Tuesday, June 25, 9:40am-10:40am

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Xavier Brossat**

EDF R&D

### **AN INTELLIGENT DECISION-MAKING MODEL FOR MULTIVARIATE DEMAND FORECASTING**

**Zhaoxia Guo**

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To forecast the overall sales of new retail products without directly available historical sales data, previous studies usually considered the historical sales of their similar products. However, it is hard to identify which past products are similar in forecasting process especially in industries with large product variety and frequent product changes. This paper addressed a retail demand forecasting problem based on early sales. An effective multivariate intelligent decision-making model is proposed to provide effective forecasts for this problem by integrating a data preparation and preprocessing module, a wrapper-based variable selection module and a multivariate intelligent forecaster module. The variable selection module selects out the optimal input variable subset from given candidate inputs as the inputs of multivariate intelligent forecaster. The intelligent forecaster is established to model the relationship between the selected input variables and the sales volumes of retail products, and then utilized to forecast the sales volumes of retail products. Extensive experiments were conducted to evaluate the proposed model in terms of extensive sales datasets from real-world retail industry. Experimental results show that it is statistically significant that the proposed model can generate superior forecasts than extreme learning machine-based model and generalized linear model.

## FORECASTING OF CUSTOMER DEMANDS IN PRODUCTION NETWORKS BASED ON PHASE SPACE RECONSTRUCTION

**Mirko Kück**

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**Bernd Scholz-Reiter**

University of Bremen

In order to achieve well-founded demand forecasts, companies have to consider several static and dynamic influences on customer demands. Moreover, applied forecasting methods often have to process volatile data resulting from increasing dynamics and complexity of current markets. In the context of production networks, methods of nonlinear time series analysis are applicable to model production systems as dynamic systems. Given a scalar time series of one component of a deterministic dynamic system, the dynamic properties of the whole system can be identified by the method of phase space reconstruction. Based on this method, the paper at hand proposes an approach to forecast customer demand data in production networks. A time series of customer demands is modelled as one component of a deterministic dynamic system with an additive noise component. After a noise reduction, the system's dynamic properties are reconstructed in phase space. On the basis of this reconstruction, a forecasting model is set up. By an application to forecast customer demands in production networks, potentials of this approach are shown in comparison to common forecasting methods.

### **A MASSIVELY DISTRIBUTED SIMULATION AND (ADAPTIVE) FORECASTING PLATFORM FOR SMART-GRIDS**

#### **Xavier Brossat**

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#### **Mathieu SINN**

Smart-grid projects are motivated by economic constraints, regulatory aspects, or environmental needs. New perspectives emerge for energy management as electric vehicles, and renewable energy production expands. A large amount of smart-meters will be deployed; they will provoke a huge amount of data utilities will have to face with. This amount of data represents great opportunities for real time individual demand management, or local optimization. To anticipate changes utilities can either proceed to real experimentations or numerical simulations. We developed an advanced platform able to : - simulate millions of realistic individual electricity consumptions based on semi-parametric models; - simulate changes of the grid topology or of electricity usages and portfolio composition - run multi-horizon adaptive consumption forecast models for dynamic aggregates (locations on the grid, customer portfolios). We show that the simulation platform allows designing lots of use cases for short-term grid management, middle and long term planning or electricity portfolio design. We show how a large number of forecasting models (describing the electricity consumption of customers taking into account local weather information) can be run in a distributed way, either on simulated or real data. We present feedback on experiments of various simulations and forecasts over the French territory.

## Energy Forecasting 4 [ EGF4 ]

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### Contributed Session:

Tuesday, June 25, 9:40am-10:40am

Room: 303, SUPEX 2nd Building, 3rd floor

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#### Chair: Towhiddul Islam

University of Guelph, Canada

### [FORECASTING WHOLESALE ELECTRICITY PRICES: A HYBRID TWO-STAGE PERSPECTIVE](#)

#### Lin Huang

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#### Yongli Zhang

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In this article, we develop a two-stage procedure composed of two econometric models for forecasting IHR (the spot implied heat rate, defined as the electricity/natural gas price ratio). In the first stage, we model the daily mean temperature through an autoregressive heteroscedasticity time series. Then the segmented linear regression model is employed in the second stage to describe the relationship between IHR and the temperature. The proposed procedure is applied to the hourly IHR of New York City between 2003 and 2008. As illustrated by simulations and empirical data, this two-stage modeling procedure performs well in predicting three major stochastic properties of IHR, namely, mean-reversion, seasonal volatility and spikes. Furthermore, it is more advantageous than the existing models for its sound microeconomic foundations and parsimonious model fitting.

### **TIME SERIES PREDICTIONS FROM CROSS-SECTIONAL DISCRETE CHOICE EXPERIMENTS: THE CASE OF PHOTO-VOLTAIC (PV) SOLAR CELLS FOR HOUSEHOLD ELECTRICITY GENERATION**

**Towhiddul Islam**

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**Nigel Meade**

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Growing energy demand, finite fossil fuel supplies, worries about energy security and environmental concerns are all factors encouraging the increasing use of renewable resources for electricity generation. We are concerned with micro-generation i.e. individual households generating electricity using a renewable technology. The primary objective of this research is to aid policy makers by linking two critical uncertainties of new technology: (1) whether and under what circumstances households prefer the attributes of new technology? and (2) when are they going to adopt (if at all)? We designed discrete choice experiment (DCE) and collected data from households from the province of Ontario, Canada where a generous feed-in-tariff is available to households. In addition to DCE data, we also collected adoption time related intention times. We estimated individual household level attributes preferences using a weighted least squares (WLS) and Bayesian approach and use these preferences along with household characteristics to predict adoption time intentions. We establish a causal link between the attributes of the technology and adoption time intentions using discrete time survival mixture analysis and mixed modelling approach. Our approaches allow us to compute the probability of adoption over a ten year period per household.

### ELECTRICITY PRICE FORECASTING IN THE SPANISH MARKET USING COINTEGRATION TECHNIQUES

**Antonio Bello Morales**

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**Javier Reneses**

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This paper proposes a methodology which aims to examine the variation and the relationship between electricity price and several explanatory variables within a Granger causality framework. This analysis uses the cointegration methodology to model stationary relationships while preserving the long-run relationship. The presence of a long-run equilibrium relationship is analyzed. However, in the short term imbalances may appear. Using what is known as Vector Error Correction Model (VECM), it is possible to relate short-term behavior of the different variables with their long-term behavior. Furthermore, this multivariate model enables both predict and analyze the dynamic relationships between the used variables. To the best of our knowledge, the causal relationship between electricity prices and several technical, weather and economic variables (such as energy commodity prices) has not yet been simultaneously analyzed in electricity markets. The methodology is comprehensively tested in a case study based on the Spanish market. Further research has been carried out in order to evaluate the existing trade-off between models complexity and adjustment capacity. Examination of the model goodness of fit and predictability is done by means of statistical and graphical tools. This approach could provide companies with valuable information when facing their decision making and risk-management process.

## Forecast Evaluation 1 [ FEV1 ]

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### Contributed Session:

Tuesday, June 25, 9:40am-10:40am

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Kajal Lahiri**

University at Albany: SUNY

### **LARGE DATASET MINING USING PARSIMONIOUS FACTOR AND SHRINKAGE METHODS**

**Hyun Hak Kim**

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**Norman Swanson**

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In this paper, we add to the literature by examining a number of novel factor estimation methods within the framework of diffusion index forecasting. In particular, we consider the use of independent component analysis (ICA) and sparse principal component analysis (SPCA), coupled with a variety of other factor estimation as well as data shrinkage methods. We carry out a number of forecasting experiments, involving the estimation of 28 different baseline model types, each constructed using a variety of specification approaches, estimation approaches, and benchmark econometric models. We find that various our benchmarks, including autoregressive models, and (Bayesian) model averaging, do not dominate more complicated nonlinear methods, and that using a combination of factor and other shrinkage methods often yields superior predictions. Indeed, our benchmark econometric models are never found to be MSFE-best, regardless of the target variable being forecast, and the forecast horizon. This is somewhat contrary to the oft reported finding that model averaging usually yields superior predictions when forecasting the types of aggregate macroeconomic variables that we examine. This result provides strong new evidence of the usefulness of factor based forecasting, although it should be stressed that principal component analysis alone does not yield this clear-cut result.

### COMPARISON ON UNIVARIATE TIME SERIES FORECASTING TECHNIQUES FOR APPAREL SALES

**Min Li**

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Sales forecasting plays an increasingly prominent role in supply chain management due to the ever-escalating global competition. Nowadays, apparel sales forecasting mainly relies on subjective assessment and experience of sales/marketing personnel. Although different forecasting techniques are available, it remains unsure how they fit different types of apparel sales data. This research compared the performances of several commonly used forecasting techniques for apparel sales forecasting, including Naïve, moving average (MA), autoregressive (AR), ARMA, ARX, ARMAX, generalized linear regression model and neural networks. Extensive comparison experiments were conducted based on a large number of real-world apparel sales time series, including trend, seasonal, irregular and random patterns. The comparison results showed that (1) the forecasting performances generated by different forecasting models are mixed for different data patterns; (2) different numbers of input variables can put great effects on the forecasting results; and (3) different accuracy measures can also impact the forecasting results greatly. The comparison presented in this paper can provide a theoretical basis for forecasting researchers and practitioners, and help them select the appropriate forecasting or benchmark models for different apparel sales forecasting tasks.

### CONFIDENCE BANDS FOR ROC CURVES WITH SERIALY DEPENDENT DATA

**Kajal Lahiri**

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We propose serial correlation robust asymptotic confidence bands for the receiver operating characteristic (ROC) curves estimated by quasi-maximum likelihood in the binormal model. Our simulation experiments confirm that this new method performs fairly well in finite samples. The conventional procedure is found to be markedly undersized in terms of yielding empirical coverage probabilities lower than the nominal level, especially when the serial correlation is strong. We evaluate the three-quarter-ahead probability forecasts for real GDP declines from the Survey of Professional Forecasters, and find that one would draw a misleading conclusion about forecasting skill if serial correlation is ignored.



## Volatility [ VOL ]

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### Contributed Session:

Tuesday, June 25, 9:40am-10:40am

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Brajendra Sutradhar**

Memorial University

### **A MULTIPLICATIVE ERROR MODEL WITH HETEROGENEOUS COMPONENTS FOR FORECASTING REALIZED VOLATILITY**

**Heejoon Han**

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We consider a modified multiplicative error model to forecast realized volatility measure. The model incorporates the heterogeneous components, the weekly and monthly realized volatility measures, adopted by Corsi (2009). While the model captures the long memory property, estimation simply proceeds by QMLE. Our model allows much higher persistence in realized volatility measures than existing models. We will investigate whether this feature is helpful in forecasting realized volatility measures. In particular, we are interested in multi-step ahead forecasting. Multi-step ahead forecasting of volatility is very important for asset allocation or risk management because these tasks are usually carried out over multiple days. We investigate its forecasting ability using the realized kernels of 34 different assets provided by the 'Oxford-Man Institute's realised library'. Our main finding is that the modified multiplicative error model outperforms the benchmark models in all respects. All results for within-sample and out-of-sample (1-step, 10-step and 22-step) forecasts show that our model clearly dominates the benchmark models such as the ARFIMA, HAR, Log-HAR and HEAVY-RM models. Our model performs the best in both pointwise and cumulative multi-step ahead forecasting. This is true in terms of both QLIKE and MSE loss functions.

### FORECASTING VOLATILITY WITH AN EFFECTIVE COVARIATE IN FINANCIAL MARKET

**Tsung-Han Ke**

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This study investigates the forecasting performance of the GARCH(1,1) model by adding an effective covariate. Based on the assumption that many volatility predictors are available to help forecast the volatility of a target variable, this study presents a method of building a covariate such that the covariate contains the maximum possible amount of predictor information of the predictors for forecasting volatility. Simulations studies verify that the proposed method performs better than other methods for forecasting the volatility, and the results are quite robust to model miss-specification. Empirical studies show that the proposed method reduces the mean square error of the GARCH(1,1) model by 30% for forecasting the volatility of S&P 500 Index, and reduces the mean square error of the GARCH(1,1) model by 49.8% for forecasting the volatility of Taiwan Weighted Stock Index.

## FORECASTING FOR VOLATILITY MODELS

### **Brajendra Sutradhar**

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Forecasting in volatile time series requires the fitting of volatility models. Existing inferences for volatility models such as using GMM (Generalized Method of Moments) approach is extremely cumbersome, and the existing QML (Quasi-maximum likelihood) approximation can be inefficient. In this paper, we propose a new simpler MM (Method of Moments) utilizing fewer moment conditions as compared to the GMM approach. Through finite and large sample studies it is demonstrated that the proposed approach performs quite well in model fitting and hence will provide better forecasting.

## Macroeconomics 2 [ MAC2 ]

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### Organized Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Ana Beatriz Galvao**

University of London

### [THE ROLE OF FORECASTERS' JUDGMENT IN MODEL BASED MACROECONOMIC FORECASTS](#)

**Michael Graff**

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The KOF Swiss Economic Institute regularly conducts forecasts for the Swiss economy, covering numerous quarterly data on flows, stocks and prices. The backbone of the forecast is a macroeconomic model introduced in 1994. Until 2007, forecasts were performed semi-annually, thereafter quarterly. As usual, the approach is eclectic. The first-run model results ('Nullprognose') are subjected to expert judgment, modified if considered necessary, and the model is re-run until the output converges to a scenario that is not only consistent with national accounting rules but also plausible to the KOF business cycle experts. In most instances, it takes no more than three rounds to arrive at the final forecast. We resort to the KOF real time database going back about 10 years comprising the two stages of our regular forecasts ('Nullprognose' and final). On this basis, we run a series of analyses to check whether the judgmental modifications of the first run actually improved the forecasts, compared to the ex post official reference series. We find that by and large, the intuition was helpful in most instances, but less so close to turning points.

### MEASURING FINANCIAL AND ECONOMIC STRESS WITH A FACTOR-AUGMENTED SMOOTH TRANSITION VAR

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We provide a new measurement of a financial conditions index using a novel factor-augmented vector autoregressive model with smooth regime changes (FASTAR). The strength of the relation between financial conditions and economic activity depends explicitly on the level of financial and economic stress, computed by extracting an unobserved factor from a large set of financial time series variables. Our approach allows us to identify the variables that best capture financial and economic stress by explicitly allowing stress to affect the underlying state of the economy. Estimation of the model is conducted in a Bayesian environment using Metropolis-Hastings steps to draw the transition function parameters and a vector of indicator variables determining the financial series entering the index. Because of the nonlinearity in the autoregressive parameters, we use the extended Kalman filter to compute the index.

## Telecommunications 2 [ TEC2 ]

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### Organized Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 302, SUPEX 2nd Building, 3rd floor

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#### Chair: Mohsen Hamoudia

France Telecom Group, France

### **EFFECTS OF ECONOMIC CONDITIONS AND POLICY INTERVENTIONS ON OECD BROADBAND ADOPTION**

#### Gary Madden

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The positive effects of broadband networks and services on productivity and economic growth are well established. Looking at broadband as an engine of economic prosperity, the OECD and its member states are seeking to foster its widespread adoption. However, which public policies best promote the adoption of broadband remains controversial. This paper contributes in two ways to this discussion. It offers a more complete framework than earlier work of the factors that influence broadband adoption, and it uses an econometric approach that is better suited to meet the challenges of empirical modelling. The framework allows drawing more nuanced policy recommendations.

### FORECASTING THE DEMAND FOR 4G MARKET USING THE MULTI-GENERATION MODELLING APPROACH

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The 4G (Fourth-Generation Wireless) allows a faster access to the internet than the 3G. It provides a wide variety of new services including the option to download, view, and upload high-definition (HD) videos, use high-quality voice and high-data-rate wireless channels. The new possibilities provided by 4G will change the way in how people will interact (high-quality streaming video, access to richer Social Networks, customized personal services, video blogging ...) and the way that many enterprises will conduct their businesses (video conferencing, collaborative applications and tools, secured accesses to data, integration of cloud applications, etc). Diffusion of successive technology generations has been well studied in the literature. Most of the applied multi-generation diffusion models are inspired by the Bass model (Bass 1969) and by Norton and Bass (1987). These models assume that each generation of technology (2G, 3G and 4G) has its own market potential and market penetration profile, and adopters of earlier generations can shift to newer generations. That was, for example, the case of adopters who moved from 2G to 3G. From the operators' and regulatory authorities' perspectives, it is very important to predict the growing path of the 4G market and to forecast the potential trends. This paper is aimed to propose a diffusion model which takes into account the interaction effect between 3G and 4G based on data for both technologies. The empirical results applied on 5 countries (Japan, South Korea, USA, UK and France) show that the forecasts generated from our modeling approach are consistent with other forecast sources. On the other hand, the estimated range of the market potential of 4G should provide the operators and regulatory authorities' some insights and additional inputs for their strategy assessment and policy formulation. Key Words: Forecasting – Mobile– Multi-Generation Models – Norton-Bass Model – 4G and 3G Diffusion Models

### **THE EFFECT OF ANNOUNCEMENTS ON HETEROGENEOUS FORWARD-LOOKING BEHAVIORS FOR A HANDHELD VIDEO CONSOLE GAME MARKET**

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During several decades, forward-looking behaviors for purchasing products have been actively discussed in marketing and demand forecasting literature. Forward-looking purchase behaviors basically stem from uncertainty of information. Particularly, uncertainty of future prices has been most frequently handled in literature as a key driver of the behaviors. However, in certain markets, such as mobile phone and console game markets, consumers' forward-looking behaviors tend to dramatically change by an announcement about new product information. We point out this tendency; in this study, we propose a structural model to capture stepped changes caused by announcements. The proposed model offers demand forecasts that reflect the stepped changes in forward-looking behaviors given an announcement plan. We incorporate the indirect externality that innately exists in hardware and software markets of systematic goods, such as CD players and video console games, into the proposed model and apply it to handheld video console sales and superstar games of the consoles in Japan. Moreover, the model considers heterogeneous consumer's response to announcements information in order to capture the different purchasing behaviors in the market. We expect that the proposed model is helpful to practitioners who develop and manage marketing plans and forecasting



## Combined Forecasting 2 [ CBF2 ]

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### Contributed Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 104, SUPEX 2nd Building, 1st floor

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#### Chair: Rodrigo Sekkel

Bank of Canada

### [BAYESIAN FORECAST COMBINATION FOR INFLATION: AN EMERGING COUNTRY CASE](#)

#### Luis Melo

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We implement a Bayesian shrinkage forecast combination methodology using different inflation models. In this methodology expert forecasts are used as prior information. To take into account two common characteristics in emerging countries economies, possible parameter instabilities and non-stationary dynamics, we use a rolling estimation windows technique for series integrated of order one. The empirical results of Colombian inflation show that the Bayesian forecast combination model outperforms the individual models and the random walk predictions for every evaluated forecast horizon. Moreover, these results outperform shrinkage forecasts that consider other priors as equal or zero weights.

### [DO COMBINATION FORECASTS OUTPERFORM THE HISTORICAL AVERAGE? ECONOMIC AND STATISTICAL EVIDENCE](#)

**Apostolos Thomadakis**

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This paper examines the out-of-sample predictability of monthly German stock returns, and addresses the issue of whether combinations of individual model forecasts are able to provide significant out-of-sample gains relative to the historical average. Empirical analysis over the period from 1973 to 2012 implies that firstly, term spread has the in-sample ability to predict stock returns, secondly, and most importantly, this variable successfully delivers consistent out-of-sample forecast gains relative to the historical average, and thirdly, combination forecasts do not appear to offer a significant evidence of consistently beating the historical average forecasts of the stock returns. Results are robust using both statistical and economic criteria, and hold across different out-of-sample forecast evaluation periods.

### [FORECASTING WITH MANY MODELS: MODEL CONFIDENCE SETS AND FORECAST COMBINATIONS](#)

**Rodrigo Sekkel**

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**Jon Samuels**

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A longstanding finding in the forecasting literature is that averaging forecasts from different models often improves upon forecasts based on a single model, with equal weight averaging working particularly well. This paper conducts a careful analysis of the effects of trimming the set of models prior to forecast combination based on their historical out-of-sample forecasting performance. We compare different trimming schemes and propose a new one based on the Model Confidence Sets that takes into account the statistical significance of historical out-of-sample forecasting performance. In an empirical application of forecasting U.S. macroeconomic aggregates in a data-rich setting, we find significant and robust gains in out-of-sample forecast accuracy from our proposed trimming method.

## Demand Forecasting 2 [ DEM2 ]

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### Contributed Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Jongsu Lee**

Seoul National University

### [WHERE ARE ALL THE CANNIBALS?](#)

**Stephan Kolassa**

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Retailers and Consumer Packaged Goods (CPG) manufacturers frequently conduct promotions, price changes and marketing campaigns. It stands to reason that part of the increased demand for a promoted product A stems from customers who switched from a non-promoted product B to A. Thus, a promotion may reduce (“cannibalize”) another product’s demand. Similarly, a promotion on one product may increase the demand for a non-promoted complementary product. Demand forecasts already routinely include uplift effects from promotions and similar interventions. In addition, experienced forecasters with mature processes have been starting to include cannibalization and complementarity effects in their forecasts. We will explore the specific challenges and lessons we learned in forecasting cannibalization and complementarity.

### STUDY ON RELATIONSHIP BETWEEN INTERNET SEARCH PATTERN AND THE SPEED OF DIFFUSION FOR PRODUCTS

**Jongsu Lee**

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The information on the internet has been explosively increased. Facebook, stock market and other services are continuously collecting large amount of information about consumers. Nowadays it is easy to access big data for the consumer's behavioral patterns and this could be used in marketing strategies. For instance, internet search pattern, which shows expected consumer purchasing behavior, has gained popularity among marketers. Although this emerging field of big data has a potential to obtain useful managerial insight, the related researches are still limited. As an attempt to utilize big data including internet search data for marketing purposes, this study conducts quantitative analysis to investigate the relationship between internet search pattern and the speed of diffusion of products. We propose an extended diffusion model which can incorporate information of big data, and apply the model to several countries and products. From the analysis, we provide a variation of country-product specific diffusion patterns to draw various new managerial strategies.

## Energy Forecasting 5 [ EGF5 ]

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### Contributed Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 303, SUPEX 2nd Building, 3rd floor

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**Chair: Soojin Jo**

Bank of Canada

### [FORECASTING THE VOLATILITY OF CRUDE PALM OIL MARKET](#)

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**Cui Jing Soh**

Universiti Putra Malaysia

Volatility forecasting in commodity price is essential in providing input to financial market risk assessment and macroeconomic models. However, to our knowledge, there is little literature about modeling and forecasting the volatility of commodity prices. This paper studies the performance of Smooth Transition Exponential Smoothing (STES) method in forecasting the volatility of crude palm oil market, compared to other popular forecasting methods such as GARCH, GJR, IGARCH and EGARCH. Daily crude palm oil prices are obtained from the Malaysia Derivatives Exchange (MDEX). Goodness-of fit statistics are used to diagnose the performance of models within-sample. We found that STES outperforms GARCH models in post-sample forecasting evaluation.

### **THE EFFECTS OF OIL PRICE UNCERTAINTY ON GLOBAL REAL ECONOMIC ACTIVITY**

**Soojin Jo**

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This paper investigates the effect of oil price uncertainty on global real economic activity using a quarterly VAR with stochastic volatility in mean. Stochastic volatility allows oil price uncertainty to vary separately from changes in the level of oil prices, and thus the impact of oil price uncertainty can be examined in a more flexible yet tractable way. In addition, this paper substantially improves on the recovery of a historical uncertainty series by incorporating an additional uncertainty indicator, i.e., a realized volatility series from daily oil price data, into the estimation process. The estimation results show that an oil price uncertainty shock alone has negative effects on world industrial production.

## Forecast Evaluation 2 [ FEV2 ]

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### Contributed Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 304, SUPEX 2nd Building, 3rd floor

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**Chair: Sheik Meeran**

University of Bass

### **IMPROVEMENT OF FORECASTING ACCURACY USING A TWO-STAGE MULTINOMIAL CHOICE MODEL BASED ON PHYSIOLOGICAL RESPONSES**

**Kyungmo Oh**

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This empirical paper compares the forecasting accuracy of a two-stage MNL model with that of an ordinary MNL model. The explanatory variables used in this study include individual choice set and physiological responses of the subject. Designed experiment was conducted to acquire the choice set and physiological data of the subject. Based on the estimation from the consideration stage, the proposed model estimated a choice set, and further forecasted the final choice of the subject using a two-stage MNL model. By calibrating the threshold value of the consideration stage in in-sample, the two-stage model can on average outperform the accuracy of an ordinary MNL model. We find evidence that (i) an explicitly-staged model using a choice set lead to better forecasts; and (ii) influential factors are different in each stage and they exhibit different effectiveness.

### MODEL SELECTION USING DIMENSIONALITY REDUCTION OF TIME SERIES CHARACTERISTICS

#### **Agus Widodo**

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To find the best forecasting model, several methods are usually tried on training dataset and the best one is selected to forecast the testing dataset. In this paper, we propose a model which selects a forecasting method based on its previous performance on similar dataset assuming that we have historical database of predictor's performance. Thus, we need to obtain the characteristics of time series for similarity measure. Since not all of time series characteristics may necessarily be used to identify certain time series, we reduce the dimensionality of those characteristics using Principal Component Analysis. We use diverse forecasting methods ranging from simple to sophisticated ones, measure as Random Walk, ARIMA, interpolation, S-curve, and Multiple Kernel Learning. To cope with large dataset, we utilize clustering and similarity measure to select only a subset of training dataset. We use the 3003 dataset from M3 competition to construct the historical database which acts as training dataset and 111 from the M1 competition as testing dataset. Our experimental results indicate that our model selection may perform well compared to each individual predictor. The advantage of our method lies in its ability to select suitable predictors without trying all of them on current dataset.



### **DO FORECASTING STUDENTS FORECAST SELF-PERFORMANCE BETTER THAN OTHER STUDENTS?**

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The inability of a person to forecast their own performance in tests, examinations and practical tasks can have serious repercussions on how they learn and develop their skills. However, such forecasts are prone to be affected by phenomena such as the ‘above average effect’, the ‘unskilled and unaware syndrome’ and the ‘false consensus effect’. A common finding in many domains has been relatively unskilled people tend to overestimate their performance, whereas skilled people tend to underestimate their skill levels. This may, at least partially, explain why it is difficult for underperforming students to learn from their mistakes. Kruger and Dunning (1999) postulated that this overestimation is due to the unskilled not realising that they are unskilled, i.e. metacognitive deficit. They suggested that teaching domain skills to unskilled could overcome this overestimation phenomenon. Here we consider another strand of this phenomenon namely, lack of skill in estimating. We hypothesise that ‘having general forecasting knowledge could increase estimation skills’ and hence reduce self-performance overestimation. To investigate this hypothesis, we compare the self-performance forecast accuracy of students who were studying ‘Business Forecasting’ with that of students from other disciplines to see whether forecasting students forecast their self-performance more accurately.

## Marketing [ MKT ]

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### Contributed Session:

Tuesday, June 25, 11:10am-12:10pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Robert Fildes**

Lancaster University Centre for Forecasting

### **ANALYSIS OF MARKETING COMMUNICATIONS MEDIA EFFECTS ON CONSUMER PRODUCT PURCHASE BEHAVIOR**

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**Yoonmo Koo**

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The 21st century, consumers are always exposed by various marketing communications media such as traditional media like newspaper, magazine, TV as well as new media like internet, IPTV, DMB. Moreover, consumers constantly receive information about products through these marketing communications media. Therefore, effects of marketing communications media on consumers' products purchase behavior is much greater than before, and this effects influence on whole process of consumers' products purchase; need recognition, information search, alternative evaluation, purchase decision, post-purchase behavior. This study analyzes effects of marketing communications media like traditional media; newspaper, magazine, radio, TV as well as new media; internet, DMB, IPTV on consumer product purchase behavior quantitatively, and forecasts which media is preferred by consumers in each process of consumer' products purchase according to consumers' characteristic. This study gives implication of corporations' scientific media advertising strategy for targeting and media planning. This study analyzes marketing communications media effects on consumer product purchase behavior quantitatively to use data of Consumer Behavior Survey which Korea Broadcast Advertising Corp (KOBACO) has done annually from 2004 and Multivariate Ordered Probit model.

## MODELING INDIVISIBLE DEMAND

**Sanghak Lee**

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**Greg Allenby**

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Disaggregate demand in the marketplace exists on a grid determined by the package sizes offered by manufacturers and retailers. While consumers may want to purchase a continuous-valued amount of a product, realized purchases are constrained by available packages. This constraint might not be problematic for high-volume demand, but it is potentially troubling when demand is small. Despite the prevalence of packaging constraints on choice, economic models of choice have been slow to deal with their effects on parameter estimates and policy implications. In this paper we propose a general framework for dealing with indivisible demand in economic models of choice, and show how to estimate model parameters using Bayesian methods. Analyses of simulated data and a scanner-panel dataset of yogurt purchases indicate that ignoring packaging constraints can bias parameter estimates and measures of model fit, which results in the inaccurate measures of metrics such as price elasticity and compensating value. We also show that a portion of non-purchase in the data (e.g., 2.27% for Yoplait Original) reflects the restriction of indivisibility, not the lack of preference.

### THE VALUE OF COMPETITIVE INFORMATION IN FORECASTING FMCG RETAIL PRODUCT SALES AND CATEGORY EFFECTS

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Sales forecasting at the UPC level is important for retailers to manage inventory planning. In this paper, we propose more effective methods to forecast retailer product sales at the UPC level by incorporating competitive information. However, competitive information has been overlooked by previous studies in forecasting retailer UPC sales, probably because of the associated high-dimensionality problem associated with the selection of variables. Under such a circumstance, time series models can easily become over-fitted. This paper considers the circumstances where competitive information is of most value, proposing methods new to the literature which significantly outperform industry benchmark models.

**Time Series Methods 2 [ TSM2 ]**

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**Organized Session:**

Tuesday, June 25, 3:30pm-4:30pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Hossein Hassani**

Bournemouth University

**ANALYSIS AND FORECASTING CHAOTIC TIME SERIES WITH SINGULAR SPECTRUM ANALYSIS**

**Nader Alharbi**

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The optimal value of the number of eigenvalues in singular spectrum analysis is considered for analysing and forecasting chaotic time series. The concept of separability between signal and noise component and the pattern of eigenvalues are used to find the best approximation of the signal component. The findings are assessed using several chaotic series namely Hénon, logistic and Tent maps.

### FORECASTING THE US TRADE SERIES USING SINGULAR SPECTRUM ANALYSIS

**Emmanuel Silva**

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The Singular Spectrum Analysis (SSA) technique is adopted to forecast a time series with structural change, namely US Trade. This study exploits the seasonally unadjusted US Trade series obtained via the U.S Department of Commerce: Bureau of Economic Analysis for the period 1989-2011, and considers the Imports, Exports, Petroleum Imports and Agricultural Exports time series. The US has experienced continuous trade deficits over the last two decades, and such deficits are notorious for creating long term negative spill over effects on the economy at large. Therefore, it is imperative that policy makers are be able to successfully fathom the underlying structure of these series and swiftly identify turning points such as the on-set of the 2008 recession. Being privy to such vital information enables policy makers to make better informed decisions and predict the on-set of structural changes in the future by studying a nation's Trade series. Structural changes result in making the series non stationary in mean and variance. SSA change point detection is used to detect the points at which structural changes occur. The results are compared with those obtained using ARIMA and Holt-Winters models which are currently used as standard forecasting methods.

### RECENT DEVELOPMENTS IN MULTIVARIATE SINGULAR SPECTRUM ANALYSIS

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The different forms of the multivariate singular spectrum analysis (SSA) and their associated forecasting algorithms are considered from both theoretical and practical points of view. The new multivariate vector forecasting algorithm is introduced and its uniqueness is evaluated. The performance of the new multivariate forecasting algorithm is assessed against the existent multivariate technique using various simulated and real data sets (namely European Electricity and Gas series). The forecasting results confirm that the performance of the new multivariate approach is more accurate than the current approach. The optimality of the window length and the number of eigenvalues in multivariate SSA are considered and various bounds are recommended. The effect of common components between two time series is evaluated through a simulation study. The concept of similarity and dissimilarity are also considered based on the matched components among series.

## Finance 3 [ FIN3 ]

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### Organized Session:

Tuesday, June 25, 3:30pm-4:30pm

Room: Chey A, SUPEX 2nd Building, 1st floor

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**Chair: Jeroen Rombouts**

ESSEC Business School

### **VARIANCE COMPONENTS, TERM STRUCTURES OF VARIANCE RISK PREMIA, AND EXPECTED ASSET RETURNS**

**Junye Li**

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**Gabriele Zinna**

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A flexible model, which takes into account volatility jumps and self-exciting jump intensities, is proposed to capture components and term structures of variance risk premia. The total variance risk premium is on average negative and has a downward-sloping term structures. In contrast, its jump component, though also negative, has an upward-sloping term structures on average. Furthermore, the short-term jump variance risk premium responds to extreme downside events more quickly and substantially and takes even longer time to go back to its long-run mean. We find that the predictive performance of variance risk premia is substantially improved, especially at the short-end, when diffusion and jump components are used separately. Moreover, the use of the term structure information measured by the variance risk premium spread can further improve the degree of return predictability.



### **THE PERFORMANCE OF PRICING APPROACHES FOR OPTIONS UNDER GARCH WITH NON-NORMAL INNOVATIONS**

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Two different pricing frameworks are typically used in the literature characterizing option prices under GARCH with non-normal innovations: the equilibrium pricing approach of Duan (1999) and the no-arbitrage approach of Christoffersen et al. (2010). Each framework can accommodate various forms of GARCH and innovation distributions, but empirical implementation and tests are typically done in one framework or the other because of the difficulty to find a model suitable for both. We contribute to this literature by comparing and documenting the empirical performance of a GARCH specification with skewed and leptokurtic Johnson su innovations which can be implemented in both pricing frameworks. We test empirically the two frameworks with constant as well as time varying risk price of risk.

### **MIXTURES MODELS, JUMPS AND OPTION PRICING**

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This paper uses asymmetric heteroskedastic normal mixture models to fit return data and to price options. The models can be estimated straightforwardly by maximum likelihood, have high statistical fit when used on S&P 500 index return data, and allow for substantial negative skewness and time varying higher order moments of the risk neutral distribution. When forecasting out-of-sample a large set of index options between 1996 and 2011, substantial improvements are found compared to several benchmark models in terms of dollar losses and the ability to explain the smirk in implied volatilities.

## Political Forecasting [ PLF ]

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### Contributed Session:

Tuesday, June 25, 3:30pm-4:30pm

Room: 302, SUPEX 2nd Building, 3rd floor

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**Chair: Yasuyuki Komaki**

NIHON UNIVERSITY

### A FACE FOR POLITICS

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Prior evidence shows that facial appearance predicts leadership emergence in different fields. Individuals perceived as more competent or attractive are more likely to become leaders. However, there has been limited research on why people are perceived differently. What is it in people's faces that influences how others perceive them? We review prior research and identify N objectively measurable facial appearance variables that impact people's perceptions (e.g., facial hair, baldness, or babyfacedness, facial symmetry). We then use the index method to determine a person's facial appearance score by counting the number of variables for which the person is rated favorably. We will then present tests of the model's accuracy in predicting candidate perceptions and election winners in electoral races across different countries. The "face for politics" model is expected to provide valuable forecasts of election winners. If so, the model has important decision-making implications, as it can help parties to select candidates and can advise candidates on if and how they can improve their facial appearance. Finally, the model can alert voters to stereotypes that influence how they evaluate a candidate. The results are expected to be valuable for other fields and occupations, which require leadership and intellectual competence skills.

## REAL TIME ESTIMATE OF FISCAL POLICY

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We have two crucial problems for the estimation of fiscal policy. One is fiscal policy lags. There are inside and outside lag as we know. Inside lag is recognition for economic condition, decision for budget, and implementation. Outside lag is that the effect of fiscal policy becomes obvious. The other is data revision. When we estimate the empirical evidence mainly using fiscal policy reaction functions, many macro-economic variables is revised after preliminary variables were published. The necessity for fiscal policy is decided by the preliminary variables at that time. In this paper, we estimate the effect of fiscal policy using real time data in OECD countries. As an earlier studies show, when fiscal policy rules are estimated on real-time data, our results indicate that OECD countries often planned a counter-cyclical fiscal stance, especially during economic expansions, whereas conventional findings based on revised data point towards pro-cyclicality. On the other hand, though multiplier effect of fiscal policy have become lower in the earlier studies on revised data, we find the multiplier effect does not change seriously on real time. As we examine the cause of different estimate as above, we divide the data into GDP and fiscal variables. We find that revision of GDP and related cause the different empirical results mainly. And initial budget data is quite different from settlement of national budget data.

## Judgmental and Scenario Forecasting 4 [ JSF4 ]

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### Contributed Session:

Tuesday, June 25, 3:30pm-4:30pm

Room: 303, SUPEX 2nd Building, 3rd floor

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**Chair: Joanicjusz Nazarko**

Bialystok University of Technology

### [HOW TO DEFINE THE CONSUMER PERCEIVED PRICE INDEX? THE CASE OF POLAND](#)

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The Prospect Theory and empirical studies suggest that consumers can be substantially influenced by prices of frequent purchases and price increases can be perceived more strongly than price decreases. To assess the importance of such effects, we propose different indices of price changes of frequent purchases in Poland. Then we evaluate them vs. CPI inflation on the basis of consumer survey data on perceived price changes. We find that Polish consumers observe a relatively wide range of goods, however both factors under consideration influence their opinions on price developments. Therefore, even if CPI inflation displays high correlation with survey data, interpreting survey data one should bear in mind that consumers think in terms of a slightly different price index, called the Consumer Perceived Price Index (CPPI). Forecasting properties of consumer inflation expectations – quantified either in a standard way, with the use of current CPI inflation as a scaling factor, or with the use of current CPPI inflation in this role – are unsatisfactory. In both cases expectations do not meet unbiasedness condition of the rational expectations hypothesis. However, in relative terms it seems that Polish consumers are capable to make more accurate predictions concerning future values of CPPI than CPI.

### **DO ANALYSTS TREAT WINNERS AND LOSERS DIFFERENTLY WHEN FORECASTING EARNINGS?**

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We investigate whether the extreme consistency of positive (or negative) stock price changes affects the well-known association between past stock returns and analysts' earnings forecast revisions. We document that there exists the asymmetric pattern in this association as a condition of whether a stock experienced a consistent capital gain (winner) or loss (loser). In particular, for winners, analysts' earnings forecast revisions tend to be de-coupled from past positive stock returns; but, for losers, the revisions tend to be more strongly coupled with past negative stock returns. We also find that the more sensitive an analyst's revision is to winners' (or losers') extreme past stock returns, the less accurate her earnings forecast is. We further find that the sensitivity decreases as she accumulates the winner-(or loser-) specific forecasting experience. The results suggest that analysts' inefficient incorporation of public information, already reflected in past stock returns, into their forecast revisions is, at least partly, attributable to their behavioral bias towards winners and losers. However, their behavioral bias attenuates as they gain more forecasting experience with winners and losers.

### SCENARIO FORECASTING OF THE INNOVATION-ORIENTED DEVELOPMENT OF MAZOVIAN ENTERPRISES

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This paper presents the methodology, research tools, and the results of a study aiming at forecasting the innovation-led development of enterprises in Mazovia region, Poland. The study methodology is based on the foresight approach, specifically, on constructing alternative development scenarios. Expert panels were the primary information (data) source. The process of composing the expert panels involved researcher, data and method triangulation. The expert panels employed the techniques of brain-storming and moderated discussion. The methodology of scenario construction combined the approaches of the intuitive logic school and prospective thinking. STEEEPVL analysis, importance and uncertainty analysis, as well as the structural analysis were used to identify the scenario driving forces. MicMac software developed by the French Computer Innovation Institute 3IE was, among others, used to conduct the calculations. As a result, two key factors influencing the innovation-led development of Mazovian enterprises were identified: (F1) Degree to which the funding of R&D institutions depends on the collaboration with industry, (F2) Effectiveness of technology transfer and technology assessment systems. Those two factors formed the axes of four scenarios: (S1) Dreams of Power, (S2) Chasing Innovation, (S3) Alone in the Dark, (S4) Do It Yourself. In the last step, the scenarios were compiled with the factors interpreted as long-term trends and wild-cards.

## Prediction Markets and Market Sentiment [ PRM1 ]

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### Contributed Session:

Tuesday, June 25, 3:30pm-4:30pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: Johnnie Johnson**

Centre for Risk Research, University of Southampton

### [PREDICTION MARKETS FOR BUSINESS FORECASTING - RESULTS FROM LABORATORY-STUDIES AND A CASE STUDY IN A MULTINATIONAL COMPANY](#)

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Prediction Markets are a rather new, but very powerful tool of economic forecasting. They have been investigated in the last years to some extent, but there is still a need of scientific evidence for their feasibility and superior usability in many fields of economic and business forecasting. Our study reveals the high degree of forecasting accuracy and combines several laboratory experiments with a case study from one of the world's biggest clothing companies. We reveal for the first time a study with a robust design that compares the three major design aspects for using this powerful tool: we vary the number of traders from only 15 up to 400 in eleven experimental groups and two case study groups; the time horizon is varied from only 30 minutes to up to 3 weeks, furthermore, we used the most important information market contract types: continuous double auction and simple bet. All factors are evaluated with practical questions as well as macroeconomic benchmark questions. Surprisingly, it turns out that short-running prediction markets produce comparable results to long term markets and small groups can compete well with groups of hundreds of participants. Even for difficult forecasting questions, non-experts perform almost similarly well as experts.

### USING POLLS, PREDICTION MARKETS AND FINANCIAL CONTRIBUTIONS TO FORECAST ELECTION OUTCOMES

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In this paper we analyze how campaign contributions affect electoral success in US Congressional Elections from 2004-2012. The key contribution of this paper is that we generate election forecasts using polling, prediction market and contributions data. We combine a vast dataset on polling, high-frequency data from 2004-2012 from Betfair and Intrade, and data on contributions from the Federal Elections Commission to form a huge and novel dataset from which to derive forecasts. We compare forecasts from all three methods, and attempt to establish the direction of causality between contributions and electoral outcomes, and to control for voter preferences at the outset of election campaigns. We find that better financed candidates are more likely to win and that candidates with better poll results attract more funding.



### FORECASTING THE PRESENCE OF FAVOURITE-LONGSHOT BIAS IN ALTERNATIVE BETTING MARKETS

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Favourite-longshot bias (FLB) is a phenomenon in betting markets reported over many decades and in many jurisdictions, whereby market prices deviate systematically from their fundamental value; favourites/longshots being under-/over- valued. This paper develops an approach for forecasting the presence of the favourite-longshot bias (FLB) in some betting markets and its absence in others. The existing accounts alternatively link the origin of the FLB to supply- (market-maker related) or demand-side (bettor-related) factors. However, these alternative accounts fail to provide a means of forecasting the presence/absence of the FLB in the two major competing types of horserace betting market in the UK (and in other jurisdictions e.g., Australia, Ireland), namely, bookmakers and betting exchanges. We develop a theoretical model which suggests the bias may result from competition between bookmakers and with betting exchanges, combined with bettors' greater demand elasticity with respect to favourites. Further, we propose that the FLB will be eliminated when informed traders dominate and transaction costs are low. We confirm the model's predictions by analysing how the bias develops throughout the active market in 6,058 races run in the UK from August 2009 through August 2010.

## Macroeconomics 8 [ MAC8 ]

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### Contributed Session:

Tuesday, June 25, 3:30pm-4:30pm

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Alain Kabundi**

University of Johannesburg

### CONSERVATISM IN INFLATION FORECASTS

**Monica Jain**

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This paper examines the extent to which a panel of professional forecasters exhibit conservatism in their announced inflation forecasts. Conservatism occurs as a result of a secondary objective captured in the forecaster's loss function: they would like to avoid having large forecast errors, but also would like to avoid making large revisions to previously announced forecasts. As a result of forecasters' reluctance to make large revisions, announced inflation forecasts change less than true inflation expectations. The Anderson-Rubin (1949) approach is used to determine the degree of conservatism in U.S. inflation forecasts, and evidence suggests it may be quite substantial. The findings in this paper have implications for research that uses forecast data. In the case that forecast data is used to understand actual inflation data, the results should be interpreted with caution. Correcting the forecast data to account for conservatism could be a helpful starting point; this paper presents a method to undo this bias.

### DOES DISAGGREGATION IMPROVE FORECASTING PERFORMANCE OF OUTPUT GAP WITH RESPECT TO INFLATION?

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In the paper we have investigated whether a disaggregation of inflation will improve forecasting performance of output gap with respect to inflation. The motivation for the analysis was the supposition that domestic output gap may have some leading properties for prices of only some goods and services while remaining prices are shaped by other factors not related to domestic demand pressure. We conducted a disaggregated analysis using price indices at the COICOP 4-digit level for the Polish economy. We specified a small open economy Phillips curve for individual price indices and we split CPI inflation basket into categories, whose prices are sensitive and insensitive to domestic economic activity. We found that more than 50 per cent of the categories react to the output gap – mostly services but also non-durable goods. Thus we aggregated the price indices for the remaining items, which are not sensitive to domestic economic activity forming a new price index. Then we substituted this index instead of lagged CPI into a traditional backward looking Phillips curve, hence separating the output gap from inflation inertia on the explanatory side of the equation. We found that the method we propose results in smaller forecast errors for inflation for forecast horizons exceeding 2 quarters in comparison with the traditional Phillips curve.

### **NOWCASTING CPI AND CURRENT ACCOUNT IN SOUTH AFRICA**

**Alain Kabundi**

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This paper predicts the present, the near future, and the near past of inflation and the current account in South Africa for December of 2012. The paper uses a dynamic factor model which contains a large number of determinants of inflation and current accounts. The news analysis indicates the importance of soft data in forecasting both variables. In addition, the findings point to the relevance of nowcasting models relative to traditional econometrics models in forecasting the present and the near future. But the traditional models perform much better in predicting the medium and the long-term inflation and current account.

## Macroeconomics 4 [ MAC4 ]

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### Organized Session:

Tuesday, June 25, 4:40pm-5:40pm

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Gian Luigi Mazzi**

European Commission - Eurostat

### **THE YO-YO-YEARS: IMPLICATIONS FOR BUSINESS CYCLE FORECASTING**

**Anirvan Banerji**

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Economic growth has slowed in recent decades across most of the developed world, while cyclical volatility has revived following the end of the Great Moderation. The confluence of these patterns of slowing trend growth and renewed cycle volatility is likely to result in more frequent recessions in developed economies, during what we call “the yo-yo years.” This is because trend growth rates and the amplitudes of cyclical fluctuations explain most of the variance in the durations of economic expansions on an international basis. Under the circumstances, relatively modest cyclical reductions in economic growth will tend to produce economic contractions in developed economies, resulting in larger cyclical swings in economic growth for export-dependent developing economies.

### **A SYSTEM FOR EURO AREA AND MEMBER STATES TURNING POINT DETECTION**

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The availability of a timely and reliable system for detecting turning points is essential for the correct follow up of the cyclical situation and it is crucial for policy and decisions makers in their daily work. Usually, turning points detection systems identify them either on the classical or on the growth cycle. Here a multivariate model is presented detecting simultaneously turning points of both cycles within the so called ABCD framework. The chosen model is a Markov-switching VAR with multiple regimes to capture different phases of both reference cycles. The model is specified by minimising error two type and maximizing the timeliness. The model is simulated in real-time by using the chronologies for both classical and growth cycle as a benchmark. The concordance index and the QPS are used to discriminate among different model specifications. It is also shown how the model, originally developed for the euro area, has been extended to its largest countries. Country economic specificities and data availability have been taken into account building up national models. Finally a real-time comparison of direct and indirect turning points detection for the euro area is presented and the resulting discrepancies are discussed.

### **Evaluating the Efficiency of FOMC's New Economic Projections**

**Arai Natsuki**

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Since 2007, FOMC policymakers have published detailed numerical projections of macroeconomic series over the next three years. By testing if the revisions of these projections are unpredictable, I find that their efficiency is maintained for inflation in almost all target years, but often rejected for real economic variables, notably for the unemployment rate. The rejection is due to the strong autocorrelation of revisions during the financial crisis. The efficiency of the entire projections is maintained in most cases.

**Time Series Methods 3 [ TSM3 ]**

**Organized Session:**

Tuesday, June 25, 4:40pm-5:40pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Hossein Hassani**

Bournemouth University

**FORECASTING INFLATION RATE: PROFESSIONAL AGAINST ACADEMIC,  
WHICH ONE IS MORE ACCURATE?**

**Johannes Hendrikus Wilhelmus Coremans**

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This paper evaluates professional forecasts of the inflation rate by comparing them to academic forecasts. The US quarterly inflation rate and the professional forecasts are considered for the period 1981 third quarter - 2012 final quarter. One year ahead forecasts of the inflation rate are used and evaluated with different criteria. This paper examines whether academic forecasts, e.g. based upon singular spectrum analysis, outperforms the professional forecasts. The random walk, singular spectrum analysis, Holt-Winters and ARIMA models are used to evaluate the accuracy of the professional forecasters performance as predictor.

### **OPTIMAL SINGULAR SPECTRUM ANALYSIS CHOICES FOR FORECASTING EXCHANGE RATES**

**Mansi Ghodsi**

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The Singular Spectrum Analysis technique depends upon two important choices i) the window length  $L$ , and ii) the number of eigenvalues  $r$ . The improper choice of  $L$  would affect the results in the decomposition and reconstruction steps, and then inaccurate forecasting results. Furthermore, by selecting  $r$  smaller than the true number of eigenvalues, some parts of the signal(s) will be lost, and if one takes  $r$  greater than the value that it should be, then noise is included in the reconstructed series. In this paper, the optimal values of these choices are evaluated for analysing and forecasting exchange rate series. Different forecasting horizons and various criteria are considered.

### **POSTERIOR SINGULAR SPECTRUM ANALYSIS**

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A method is proposed for finding interesting underlying features of a time series, such as trends, maxima, minima and oscillations. A combination of Singular Spectrum Analysis (SSA) and Bayesian modeling is used where the credibility of SSA signal components are analyzed via posterior simulation. The potential of the technique is demonstrated using artificial and real data examples.

## Judgmental and Scenario Forecasting 3 [ JSF3 ]

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### Contributed Session:

Tuesday, June 25, 4:40pm-5:40pm

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Paul Goodwin**

University of Bath

### [A FORECAST COMPETITION FOR PASSENGER VEHICLE SALES: DOES STATISTICAL TIME SERIES FORECASTING OUTPERFORM EXPERT JUDGMENT?](#)

**Lennart Blech**

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This paper evaluates the accuracy of approx. 2,000 judgmental forecasts for yearly passenger vehicle sales in forty-seven worldwide markets from the Economics and Sales departments of an automotive OEM. ARIMA and VAR models based on monthly data perform worse than judgmental forecasts, whereas exponential smoothing forecasts are more accurate. Judgmental forecasts are more suitable for forecasts for the following year, where the relative accuracy gap to exponential smoothing is significantly smaller. However, judgmental forecasts are most accurate in several circumstances when reliable contextual information is available. In particular, experts display a better foresight of turning points in the presence of contextual information. Judgmental biases are only circumstantially evident in expert forecasts. In the forecast process, Sales departments' forecasters are initially more likely to display judgmental biases. Due to validity checks with independent sources at the central Sales division, forecasts are not significantly less accurate than from the Economics department and an external judgmental forecast provider. Yet, a judgmental bias is visible arising from anchoring and insufficiently adjusting forecasts when new information becomes available. Overall, I find no indication of the number of experts deployed to a forecasting task being an indicator for more accurate passenger vehicle sales forecasts.



### **A MODEL TO SCENARIOS TREES GENERATION USING A NON PARAMETRIC TECHNIQUE AND MONTE CARLO SIMULATION**

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This paper proposes a new methodological approach for generating synthetic series to build scenarios trees used in stochastic optimization models. This formulation is thoroughly used in the medium-term energy planning in Brazil. Departing from a periodic stochastic model, the methodology combines the well-known nonparametric technique Bootstrap and a Monte Carlo simulation procedure in the construction of probabilistic scenarios trees that are used in the Forward and Backward simulations of the optimization procedure via a Stochastic Dual Dynamic Programming.

### THE EFFECT OF INFORMATION, INCENTIVES AND TIME SERIES CHARACTERISTICS ON JUDGMENTAL ADJUSTMENTS TO STATISTICAL DEMAND FORECASTS

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Surveys show that forecasters in supply chain companies frequently make judgmental adjustments to statistical demand forecasts produced by their software. These adjustments can improve accuracy when they take into account the effect of special events, like product promotions, that have not been accounted for in the statistical model. However, a recent study of around 70,000 company forecasts found that these adjustments tended to be over optimistic, even when symmetric loss functions apparently applied. We report the result of an experiment designed to find how forecasters making adjustments use information when different types of incentives apply. Participants were supplied with combinations of positive and negative information relating to a forthcoming product promotion and received rewards either for accurate forecasting, above expected demand uplift, or both. A fourth group did not receive a reward for performance. We then modelled the effects of incentives, information type and time series characteristics on the size of the adjustments that were made. The implications for forecasting practice will be discussed.

## Prediction Markets and Market Sentiment [ PRM2 ]

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### Contributed Session:

Tuesday, June 25, 4:40pm-5:40pm

Room: 105, SUPEX 2nd Building, 1st floor

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**Chair: James Reade**

Birmingham University

### ADVANCE SIGNALS FOR PRICE CHANGES IN REAL ESTATE ASSETS

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The recent financial crisis has re-ignited interest in the macroeconomic and financial time series that have traditionally been used to predict turning points in the business cycle. Investors retain significant interest in obtaining early signals for turning points in economic activity and in particular for imminent recessions. Current work in this area makes greater use of information from sentiment/confidence surveys and composite leading indicators. These indices now receive increasing publicity and hence they are closely monitored, especially as economic data are revised significantly. As such, it is plausible to assume that they influence investors' expectations and attitudes. An asset class to which this work is of particular relevance is real estate as it lags the economy and strong lead signals for changing trends in the performance of the assets should be obtained. In the recent financial crisis, real estate values collapsed. Advance signs of increasing downside risks could feed into real asset valuations, resulting in smoother and more gradual valuation adjustments than the abrupt corrections the real estate market has previously experienced, leading in turn to panic reactions with repercussions beyond real estate. Banks could also take these signals on board to implement changes to their lending policies. In general, information about the likely state of the real estate market in the near future gives valuable information to managers to adjust the real estate component of their mixed asset portfolios before the expected downside risks materialise. The present study investigates whether turning points and in particular periods of positive and negative values in real estate can be announced in advance. Typically, in turning point analysis researchers are primarily preoccupied with two questions: (i) which series with leading characteristics to include and (ii) which methodological framework to use. With regard to (i) in this study we examine the predictive content of two leading indicators, those of the OECD and of the Conference Board. We

investigate whether these indicators contain leading information for forthcoming negative/positive values in real estate. With regard to (ii) our base methodology is a probit model which contains the leading indicators individually and combined. A second methodology is based on recent developments in the Markov switching (MS) framework, that is MS models augmented with an autoregressive structure and exogenous variables which in our case are the two leading indicator series. Further, we examine whether there are any gains from combining the inferences from these specifications, a suggestion put forward in recent work. The specifications are used to generate real time forecasts which are then evaluated with two loss functions: the quadratic probability score and the log probability score. The study applies to data from different geographies: the US, UK, France, Germany, Australia and Japan. We attempt to address the important issues of whether the results differ in terms of the lead structure, the success of the turning point predictions and ultimately which indicator and methodology are more appropriate by geography. Of course, dissimilarities in the findings could reflect data measurement problems which are discussed. We identify the countries for which the signals provide a better turning point indicator and we focus this study on offices, the most data rich sector in the real estate asset class.

### **FORECASTING AN ELECTION**

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Election betting markets can be traced at least as far back as the 1503 Papal conclave and the 1868 US Presidential election. In this paper the history of election betting is briefly traced and use is made of a novel dataset to assess the best method for forecasting an election. We consider daily data of forecasts from sources such as expert opinion, econometric models, opinion polls and prediction markets. We also consider the existence, extent and implications of biases in a data set derived from a major political prediction market.

## Finance 8 [ FIN8 ]

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### Contributed Session:

Tuesday, June 25, 4:40pm-5:40pm

Room: 302, SUPEX 2nd Building, 5th floor

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**Chair: Angi Roesch**

FOM University of Applied Sciences, Munich

### **PREDICTABILITY OF TECHNICAL ANALYSIS: A COMBINATION APPROACH**

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The fact that individual technical trading rules have certain level of predictability of future stock returns suggests potential gains from combining the forecasts of future stock returns using these individual technical rules. This paper proposes a new weighting method, namely a Global Minimum Variance weighting (GMV) scheme, to combine a range of popular technical trading rules, including the random walk, AR(1), GARCH-M, moving average and momentum trading strategies. By using monthly data of randomly selected individual stocks on NYSE/AMEX and NASDAQ during the period 1926:01 to 2011:12, we show that our GMV combination method provides improved out-of-sample forecasting performance of stock returns measured by both mean squared forecasting errors and profitability.

### OVERCONFIDENCE AND EXCESS ARBITRAGE

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We investigate the effects of arbitrageurs' behavioral biases on cross-sectional equity returns under the assumption that arbitrageurs are Bayesian optimizers. We demonstrate that the profits of equity market neutral trading strategies are positively affected by overestimation, but do not find evidence of overprecision and self-attribution bias in these trading strategies. Of the last four decades since 1970, the effects of overconfidence on the profits of the trading strategies are the highest in the 2000s when arbitrage trading is active. Despite the active arbitrage trading, however, the potential profitability measured by alphas does not seem to be eroded away. As an explanation of why the performance of equity market neutral hedge portfolios appears to decrease significantly in the 2000s, we propose excess arbitrage trading driven by overconfidence. That is, the temporal profits of arbitrage strategies temporally increased by excessive trading of overconfident arbitrageurs are subsequently reversed. The poor performance that hedge fund managers suffer comes from the reversal of the selected hedge portfolios, the selection of which is affected by upward bias in temporal profits.

### ARE CONNECTEDNESS CYCLES OF EQUITY MARKETS SYNCHRONOUS? A WAVELET ANALYSIS.

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Measures of spillovers between international equity markets can be derived building on the well-established forecast error variance decomposition in a vector autoregression (VAR) framework. Typically, a day-by-day monitoring of these measures leads to non-stationary time series, the patterns giving rise to speculations about the existence of cyclicity. The focus of our contribution is on detecting and quantifying cycles in the intensity of spillovers and assessing the synchronization between them. Obtaining dynamic insight into the cyclicity of market connectedness is of vital interest for investors seeking to diversify their portfolios, as it is vital for decision makers to track business cycles. Spillover cycles of different frequencies and of different limited duration may overlap in time. The concepts of continuous wavelet transforms enable us to appropriately resolve the arising time and frequency resolution dilemma. We study multivariate relationships by applying cross-wavelet analysis tools. The corresponding concepts of wavelet coherency and phase-difference enable us to identify differences and similarities in the cyclicity of different types and directions of spillovers. Our empirical basis consists of daily international equity market data. Comparing outgoing and incoming spillovers, we find that some equity markets are leading at certain frequencies of high coherency, while others are lagging.





## Keynote Speech [ K4 ]

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### Plenary Session:

Wednesday, June 26, 8:30am-9:30am

Room: Auditorium, Building No.1, 1<sup>st</sup> floor

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**Chair: Rob J. Hyndman**

Monash University, Australia

#### **FORECASTING FINANCIAL MARKETS: SOME LIGHT FROM THE DARK SIDE**

**(IJF Editor Invited Speaker)**

Roy Batchelor, Cass Business School, London, United Kingdom

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Success in financial forecasting is elusive, but promises rich rewards. The field continues to attract a wide range of talent, from high-tech academic “quants”, “fundamentalist” analysts, and a long tail of practitioners of “technical analysis”, a term that covers anything from pattern recognition in charts to wave theory, magic numbers, and astrology. The mainstream view in finance textbooks is that in efficient markets any but the most advanced forecasting methods are doomed to failure. It is therefore an uncomfortable fact, supported by much survey evidence and requiring explanation, that most traders most of the time claim to use technical analysis to support their trading decisions. Over the past decade I have spent time these analysts, collecting data on their track records, and investigating their methods. This talk reports findings from these travels on the dark side of the financial forecasting profession. To summarize my conclusions:

- There are many charlatans on the dark side, who may entertain or fleece retail investors, but few of these characters have any market impact
- There is a gap between academics caricature of technical analysis, and the behavior of serious professional technical traders
- There is also a gap between what technical traders say they do, and what they actually do when their own or client money is at risk
- There is a core of valuable insight to be gained from some of the pattern-based methods used by technical analysts
- This is consistent with developments in our understanding of how markets operate when populated by traders using heterogeneous forecasting methods.



**Roy Batchelor** is Professor of Banking and Finance at Cass Business School, City of London. He is Associate Dean for the schools highly ranked MBA programmes, and Director of the Cass Executive MBA programme in Dubai. He is a Fellow and Research Professor at the CES-Ifo Institute of the University of Munich, and Visiting Professor of Finance at the British University in Dubai. Professor Batchelor’s research and teaching now focuses on economic and financial market forecasting, the interpretation and use of consumer and business survey data, rationality and behavioral finance, and risk management in financial markets. He has published widely in academic journals in these fields. He has been Associate Editor of the International Journal of Forecasting, and is currently an Editor of the practitioner journal Foresight. He is co-author, with Professor Pami Dua, of Financial Forecasting (Edward Elgar, 2004, 2 volumes, 1133 pages).

## Forecasting Methods 1 [ FMT1 ]

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### Organized Session:

Wednesday, June 26, 9:40am-10:40am

Room: 101, SUPEX 2nd Building, 1st floor

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#### Chair: Kesten Green

University of South Australia

### [WHEN SIMPLE ALTERNATIVES TO BAYES FORMULA WORK WELL: REDUCING THE COGNITIVE LOAD WHEN UPDATING PROBABILITY FORECASTS.](#)

#### Paul Goodwin

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Bayes theorem is the normative method for revising probability forecasts when new information is received. However, for unaided decision makers its application can be difficult, effortful, lacking in transparency and even counter-intuitive. Two heuristics are proposed that approximate Bayes formula. They aim to yield accurate decisions while also reducing cognitive effort and appearing to be intuitively reasonable. Take the Average simply involves taking the mean of a prior probability and its associated likelihood. A generalization of this heuristic, Sum the Pros, Sums the Cons compares the sum of the probabilities and likelihoods 'favouring' the occurrence of an event with the sum 'disfavouring it. The performance of the heuristics was assessed over a wide range of prior probabilities and likelihoods when the new information was either an unbiased or a biased indicator. Two types of decisions were examined: i) where the most probable of two events has to be identified and ii) where a choice has to be made between an option yielding an intermediate utility for certain or a gamble which will result in either a worse or better utility ('certainty or risk' decisions). For 'most probable event' decisions, when the indication is unbiased, Take the Average is certain to result in the correct decision. In the other cases the use of the appropriate heuristic will typically lead to the correct decision for about 95% of 'most probable event' decisions and about 86% of 'certainty or risk' decisions.

### ACCURACY OF VOTE EXPECTATION SURVEYS IN FORECASTING ELECTIONS

**Andreas Graefe**

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Simple surveys that ask people who they expect to win an election are among the most accurate methods for predicting U.S. presidential election results. Vote expectations failed to pick the winner in only 18 (8%) of 214 surveys conducted from 1932 to 2012. Across the seven elections from 1988 to 2012, vote expectations outperformed four established methods (polls, prediction markets, econometric models, and experts' judgment) in predicting election winners and vote shares. Vote expectation surveys are accurate, inexpensive, and easy to conduct. They should be more strongly utilized by election observers as well as researchers.

## Judgmental and Scenario Forecasting 5 [ JSF5 ]

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### Contributed Session:

Wednesday, June 26, 9:40am-10:40am

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Choong-Yuel Yoo**

KAIST - Korea Advanced Institute of Science and Technology

### [THE EFFECT OF SENSE OF POWER ON FINANCIAL FORECASTS FROM FRACTAL GRAPHS](#)

**Daphne Sobolev**

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**Nigel Harvey**

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Over the past three decades, effects of individuals' personalities and dispositions on the behavior of markets have been the subject of considerable interest within behavioural finance. Judgmental forecasting may mediate such effects. If so, personality and dispositions should influence forecasting behaviour. To examine whether they do, we investigated the effects of personality and a sense of power on judgmental forecasts from simulated price series. The series used as stimuli were fractals, which were considered by Mandelbrot and others to be appropriate for modelling price data. Participants' sense of power was primed by a memory test. The 'Big Five' personality traits were measured using a short questionnaire. The majority of participants produced forecasts that imitated the appearance of price graphs from which their forecasts were made: Sequences of forecasts were noisier when the data series appeared to contain more noise. Furthermore, participants who were in the high power condition and participants who were highly conscientious showed a greater degree of imitation.

## EFFICIENT ANALYST FORECASTS COMBINATIONS

**Andrey Vasnev**

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This paper follows Genre et al. (2013) and looks at combining expert forecasts in two applications: earnings per share (EPS) data from the International Brokers' Estimate System and the US macro data forecasts from Bloomberg. Opposite to Genre et al. (2013) the finding is that we can improve upon the simple benchmarks such as mean or median. To achieve this improvement one needs to identify a small pool of good forecasters and use them for forecast combinations. In both applications the equal weights are sufficient for an improvement. For macroeconomic data the performance based weights can provide even better results.

## **UNDERSTANDING ACCOUNTING CONSERVATISM: EVIDENCE FOR ITS IMPORTANCE TO ANALYST FORECAST ACCURACY AND MARKET RESPONSES**

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We investigate whether analysts benefit from understanding accounting conservatism. To measure analysts' understanding of accounting conservatism, we introduce a novel measure of the match (or alignment) between an analyst's asymmetric timeliness in her earnings forecast revisions and a company's asymmetric timeliness in recognizing reported earnings. We find that analysts who better match their forecast conservatism with companies' accounting conservatism produce more accurate forecasts and have a greater influence on the market. The results suggest that analysts can benefit from correctly understanding accounting conservatism, and that their ability to understand companies' accounting conservatism serves as an important source of analyst expertise.

## Macroeconomics 10 [ MAC10 ]

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### Contributed Session:

Wednesday, June 26, 9:40am-10:40am

Room: 103, SUPEX 2nd Building, 1st floor

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**Chair: Roberto Golinelli**

University of Bologna

### **FORECASTING GDP AT THE REGIONAL LEVEL WITH MANY PREDICTORS**

**Robert Lehmann**

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**Klaus Wohlrabe**

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In this paper, we assess the accuracy of macroeconomic forecasts at the regional level using a unique data set at quarterly frequency. We forecast gross domestic product (GDP) for two German states (Free State of Saxony and Baden-Württemberg) and Eastern Germany. We overcome the problem of a 'data-poor environment' at the sub-national level by including more than 300 international, national and regional indicators. We calculate single-indicator, multi-indicator and pooled forecasts. Our results show that we can significantly increase forecast accuracy compared to an autoregressive benchmark model, both for short- and long-term predictions. Furthermore, our best leading indicators describe the specific regional economic structure better than other indicators.

## FORECASTING CHINESE GDP WITH MIXED FREQUENCY DATA

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Building on the MIDAS approach pioneered by Ghysels and co-authors we evaluate the predictive power of monthly indicators for quarterly Chinese GDP growth over a whole range of forecast horizons (365 days to 1 day prior to a GDP data release). The predictive power of monthly indicators relative to an autoregressive benchmark model increases as the forecast horizon gets narrower, but drops sharply after publication of a (lagged) quarterly GDP observation. The consumer price index turns out to be a valuable indicator throughout the whole range of forecast horizons. Industrial production is a valuable indicator for nowcasting, but not for forecasting. “Exotic” indicators – electricity use and railway freight transport turnover – which get high media attention turn out to have substantially lower predictive power than “standard” leading indicators. Despite their publication lack the China leading indicators published by the OECD outperform the leading indicator published by the Chinese National Bureau of Statistics. Furthermore, we evaluate the predictive power of monthly indicators conditional on different polynomial weighting schemes within the MIDAS setup. We find the predictive power to be quite sensitive to the choice of weighting scheme. Hence, a careful weighting scheme pre-selection can improve forecasts substantially.

### FORECASTING EURO AREA GDP AND ITS DEMAND COMPONENTS. A PSEUDO REAL-TIME APPROACH.

#### **Roberto Golinelli**

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#### **Carmine Pappalardo**

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The growing availability of timely released indicators on the evolution of economic activity constitutes a source of information which is potentially useful when forecasting macroeconomic aggregates. Building on the literature on regularization and dimension reduction methods, we develop a quarterly forecasting model for the euro area GDP and the main demand components. The method consists in bridging quarterly national accounts using factors extracted from a large panel of monthly and quarterly series including real activity, business surveys and financial data. Starting from a large information set of about three hundred variables, we select a subset of targeted predictors using alternative data reduction techniques. The quasi real-time nature of the information set is accounted for as the pattern of publication lags is considered. Specifically, for each quarter, we consider three alternative data sets with reduced information gaps. Diffusion index forecasting models are then estimated to make short-run forecasts. Forecast evaluation exercises show that predictions obtained through the various dimension reduction methods outperform those from benchmarks (an AR model and a diffusion index model without pre-selected indicators). Moreover, survey data turn out to be valuable for now-casting when “hard” data is not yet available. Finally, forecast combination reduces significantly the forecast error.



## Forecasting Methods 2 [ FMT2 ]

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### Organized Session:

Wednesday, June 26, 11:10am-12:10pm

Room: 101, SUPEX 2nd Building, 1st floor

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**Chair: Kesten Green**

University of South Australia

### [AN EVALUATION OF SIMPLE FORECASTING MODEL SELECTION RULES](#)

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**Robert Fildes**

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A major problem for many organisational forecasters is to choose an appropriate forecasting method for a large number of data series. Model selection aims to identify the best method of forecasting for an individual series within the data set. Various selection protocols have been proposed in order to enhance forecasting accuracy. In theory, model selection is appealing, as no single extrapolation method is better than all others for all series in an organizational data set. However, empirical results have demonstrated limited effectiveness of these often complex protocols. The current study attempts to explore the circumstances under which model selection is beneficial. Three measures are examined for characterising the data series, namely predictability (in terms of the relative performance of the random walk but also a method, Theta, that performs well), trend and seasonality in the series. In addition the attributes of the data set and the methods also affect selection performance, including the size of pools of methods under consideration, the stability of methods' performance and the correlation between methods' outputs. In order to assess the efficacy of model selection in the cases considered, simple selection rules are proposed, based on within-sample best fit or best forecasting performance for different forecast horizons. Individual (per series) selection is contrasted against its simpler approach (aggregate selection), where one method is applied to all data series. Moreover, we examine simple combination of methods. The analysis shows that individual selection based in the past forecasting performance averaged across multiple horizons works best when specific sub-populations of data are considered (trended or seasonal series), but also when methods' ranked performance is stable or no method is dominant across the examined series.

### DOES BIG DATA ENCOURAGE VIOLATION OF THE GOLDEN RULE OF FORECASTING?

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**J. Scott Armstrong**

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Conservative forecasting assumes that typical behavior in the past provides useful information on what is likely to happen in the future. We argue that conservatism is the Golden Rule of Forecasting, and show evidence on the value of conservative forecasting with various methods. We examine how conservatism affects accuracy for judgment, extrapolation, and causal forecasting methods. The Golden Rule is most important when uncertainty and complexity are high. Forecasting research and practice over the past century have, however, tended to ignore the Golden Rule and have instead been lured onto the rocks of invalidity by the temptations of the sirens of complex methods and large databases. This unfortunate trend, exemplified by stepwise regression, data mining and “big data” have harmed accuracy and the quest for an understanding of causal relationships and for methods that can realistically represent them.

## Judgmental and Scenario Forecasting 6 [ JSF6 ]

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### Contributed Session:

Wednesday, June 26, 11:10am-12:10pm

Room: 105, SUPEX 2nd Building, 1st floor

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#### Chair: Seppo Pitkänen

Lappeenranta University of Technology

### TASK DECOMPOSITION AND NEWSVENDOR DECISION MAKING

#### Yun Shin Lee

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#### Enno Siemsen

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We separate newsvendor order decisions into point forecasts, uncertainty judgments, and service level decisions in a behavioral laboratory experiment. Structuring order decisions in such a way can lead to performance improvements, and enable us to more closely examine these components. Point forecasts are influenced by the underlying overage and underage cost parameters, and suffer from demand chasing. Uncertainty judgments are subject to overconfidence, and service level decisions suffer from a cognitive dissonance bias where service levels are rarely set below 50 percent. In a set of additional experiments, we show that these biases can be partially mitigated by properly structuring and framing these lower level judgments and decisions.

### INCONSISTENCY PROBLEM OF SUBJECTIVE CONDITIONAL PROBABILITIES

**Seppo Pitkänen**

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In some judgmental and semi-quantitative methods (e.g. Delphi, cross-impact analysis, etc.) the experts are asked to give probabilities for coming events, e.g. what is the probability, that event X occurs by some given year. Mutually dependent events lead here to giving conditional probabilities. Because the evaluations are most often quick and intuitive, it seldom happens, that the total probability equals to one. We need not reject the data therefore, but we can try to correct the inconsistent conditional probability matrix to meet the exact probability laws, and save as much as possible of the original information at the same time. At least two methods have been developed for solving the problem so far, but they suffer from some difficulties, and especially they are computationally heavy. We present here a more flexible approach, which yields the same results in practice. We also ask, however, whether this kind of heavy methods are necessary at all, for very close results can be obtained by simple arithmetic calculations, although the probability rules are slightly violated.

## Tourism Forecasting 2 [ TOM2 ]

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### Contributed Session:

Wednesday, June 26, 11:10am-12:10pm

Room: 302, SUPEX 2nd Building, 3rd floor

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#### Chair: Miriam Scaglione

Institute of Tourism/University of Applied Sciences and Arts Western Switzerland Valais

### **FORECASTING FOREIGN TOURISM DEMAND IN FOUR MAJOR EUROPEAN CITIES: ACCURACY OF UNI- AND MULTIVARIATE APPROACHES WHILE EMPLOYING MONTHLY DATA**

#### Ulrich Gunter

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Tourism demand in four major European cities (Barcelona, Berlin, Paris and Vienna) originating from their four common major foreign source markets (Italy, Japan, UK and US) is forecast. In order to do so, monthly total arrivals data from the TourMIS database are employed for the period 2004M01 to 2011M12. Using expanding estimation windows and allowing for seasonality, the out-of-sample forecast accuracy of four univariate (naïve-1, ARIMA, SARIMA and ETS) as well as four multivariate (static regression, VAR, BVAR and TVP) approaches is assessed, whereby the multivariate approaches consider own and substitute destination price indices as additional variables. Evaluating the summary RMSE for forecast horizons  $h = 1, 2, 3, 6$  and 12 months ahead, in the case of Paris data ARIMA performs best for  $h = 1$ , BVAR for  $h = 2$  and ETS for all longer horizons. Vector-autoregressive and time-varying-parameter specifications immediately follow all best-performing models in terms of accuracy. The summary MAE corroborates these rankings. Ongoing research is currently extending this forecast evaluation exercise to the remaining three cities.

### **FLASH INDICATORS AND THEIR IMPLEMENTATION AT THE OBSERVATOIRE VALAISAIN DU TOURISME**

**Miriam Scaglione**

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The implementation of a system allowing periodical forecasting using Flash Indicators at the Observatoire Valaisain de tourisme (OVT) has raised some interesting challenges. Firstly, from the point of view of the collection and organization of data needed for the forecasts, OVT built a Data warehouse where data are entered from very different sources, formats and geographical locations of reference. The national sources of data come from different levels of government organization: city, cantonal and federal (overnights, weights of garbage, etc), and there are other macroeconomic data obtained from international data bases (Jobless rates at origin markets, Interest rates, Stock prices, exchange rates) and from private companies (supermarket visits, electricity consumption, etc.) Secondly, from the point of view of the forecast, different algorithms based either on Stock&Watson or Koopman &Brauning are tested. The present research will show the processes of a number of factors selected for those models given the initial set of exogenous variables of more than 200. The research will show the most important aspects of these two challenges, especially taking into account the importance of the punctual release of flash indicator nowcasts.

## Macroeconomics 9 [ MAC9 ]

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### Contributed Session:

Wednesday, June 26, 11:10am-12:10pm

Room: 104, SUPEX 2nd Building, 1st floor

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**Chair: Christian Dreger**

DIW Berlin

### FORECASTING WITH A NONCAUSAL VAR MODEL

**Henri Nyberg**

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**Pentti Saikkonen**

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We propose simulation-based forecasting methods for the noncausal vector autoregressive model proposed by Lanne and Saikkonen (2012). Simulation or numerical methods are required because the prediction problem is generally nonlinear and, therefore, its analytical solution is not available. It turns out that different special cases of the model call for different simulation procedures. Simulation experiments demonstrate that gains in forecasting accuracy are achieved by using the correct noncausal VAR model instead of its conventional causal counterpart. In an empirical application, a noncausal VAR model comprised of U.S. inflation and marginal cost turns out superior to the best-fitting conventional causal VAR model in forecasting inflation.

### **LARGE-SCALE FACTOR MODELS IN FORECASTING INFLATION IN POLAND**

**Grzegorz Szafranski**

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In a framework of dynamic factor analysis the researchers study correlations among hundreds of variables searching for the common forces driving macroeconomic processes. With a similar motivation central bankers construct factor-based leading indicators to forecast inflation or output in real time. When it comes to the data, a proper approximation and identification of the ‘true’ factor structure are often crucial points of the analysis. Simple methods for estimating factor scores like a principal component analysis perform quite well in large datasets. Other, quasi maximum likelihood methods based on state space formulation and Kalman filter need more attention, because they are naturally dedicated to deal with important empirical problems like unsynchronous data releases, outliers or mixing the data frequency. In a Monte Carlo simulation we analyze short-sample properties of likelihood-based methods for estimating and forecasting common dynamic factors under: model misspecification, factor block structure, missing data and non-normality. In the empirical part we analyse different strategies for estimating and forecasting with dynamic factor models of large dimension. In a real-time exercise we compare their abilities to predict inflation in Poland.

### **MONEY DEMAND AND THE ROLE OF MONETARY INDICATORS IN FORECASTING EURO AREA INFLATION**

**Christian Dreger**

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**Juergen Wolters**

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This paper examines the stability of money demand and the forecasting performance of a broad monetary aggregate (M3) as well as excess liquidity and excess inflation in predicting euro area inflation. The out-of sample forecasting performance is compared to a widely used alternative, the spread of interest rates. The results indicate that the evolution of M3 is still in line with money demand even when observations from the economic and financial crisis are included. Both excess measures and the spread are useful to predict inflation.



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**ADDENDUM**

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*Updated on June 19, 2013*

**1. Macroeconomic 11 (MAC 11)**

**Chair: Nobuo Iizuka**

KANAGAWA University, Japan

Monday, 24 June, 11:30am-12:30pm

Including two papers:

(1) [\*\*THE CO-MOVEMENT OF HOUSING PRICE AND THE GROWTH OF OUTPUT\*\*](#)

**Jae Ho Yoon**

POSCO Research Institute, Korea, Republic Of

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[\*\*PREDICTING ECONOMIC TURNING POINTS BY PROFESSIONAL FORECASTERS -ARE THEY USEFUL?\*\*](#)

**Nobuo Iizuka**

KANAGAWA University, Japan

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**2. Macroeconomic 12 (MAC 12)**

**Chair: Yamasawa Nariyasu**

Atomi University, Japan

Monday, 24 June, 2:00pm-3:00pm

Including two papers:

(1) **EVALUATING THE EFFICIENCY OF FOMC'S NEW ECONOMIC PROJECTIONS**

**Arai Natsuki**

Johns Hopkins University, United States

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[\*\*GLOBAL ECONOMIC FORECAST TO 2050\*\*](#)

Yamasawa Nariyasu

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## International Institute of Forecasters

The International Institute of Forecasters (IIF), a non-profit organization founded in 1981, is dedicated to developing and furthering the generation, distribution, and use of knowledge on forecasting through the following objectives:

- Develop and unify forecasting as a **multidisciplinary field of research** drawing on management, behavioral sciences, social sciences, engineering, and other fields.
- Contribute to the **professional development** of analysts, managers, and policy makers with responsibilities for making and using forecasts in business and government.
- Bridge the gap between **theory and practice**, with practice helping to set the research agenda and research providing useful results.
- Bring together decision makers, forecasters, and researchers from **all nations** to improve the quality and usefulness of forecasting.

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As the premier, international forecasting conference, the ISF provides the opportunity to interact with the world's leading forecasting researchers and practitioners. The ISF offers a variety of networking opportunities, through keynote speaker presentations, academic sessions, workshops, meals, and social programs. The IIF has held the International Symposium on Forecasting in cities around the world beginning with Quebec City in 1981 and most recently in Boston-USA in 2012. The ISF is usually held in the third or fourth week of June, if possible. Our general policy is to alternate each year's location between North America and the rest of the world, to reflect the international member demographics of our organization.

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- **Complimentary listing as a consultant, job postings**
- **Access to on-going research**

The annual membership rates to the IIF are US\$145 (one year) and US\$265 (two years) for regular members and US\$55 for students. If you would like to receive only one of our publications—The International Journal of Forecasting OR Foresight: The International Journal of Applied Forecasting—your annual membership rate will be US\$125 and US\$40, respectively.



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| <input type="checkbox"/> Student Membership, USD\$55 <sup>*</sup> | Please specify IIF <input type="checkbox"/> or Foresight <input type="checkbox"/> |

<sup>\*</sup>Students must provide proof of student status; a copy of student identification or letter from university.

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