EC1739: **The chopthin algorithm for resampling**

Presenter: **Din-Houn Lau**, Imperial College London, United Kingdom

Co-authors: Axel Gandy

Resampling is a standard step in particle filters and more generally sequential Monte Carlo methods. We present an algorithm, called chopthin, for resampling weighted particles. In contrast to standard resampling methods the algorithm does not produce a set of equally weighted particles; instead it merely enforces an upper bound on the ratio between the weights. A simulation study shows that the chopthin algorithm consistently outperforms standard resampling methods. The algorithms chops up particles with large weight and thins out particles with low weight, hence its name. It implicitly guarantees a lower bound on the effective sample size. The algorithm can be implemented very efficiently, making it practically useful. We show that the expected computational effort is linear in the number of particles. Implementations for C++, R (on CRAN), Python and for Matlab are available.

EC1314: **Autoregressive conditional duration model with an extended Weibull error distribution**

Presenter: **Boris Choy**, University of Sydney, Australia

Trade duration and daily range data often exhibit asymmetric shape with long right tail. In analysing the dynamics of these positively valued time series under autoregressive conditional duration (ACD) models, the choice of the conditional distribution for innovations has posed challenges. A suitably chosen distribution, which is capable of capturing unique characteristics inherent in these data, particularly the heavy tailedness, is proved to be very useful. A new Weibull distribution is introduced which is shown to perform better than the existing Weibull distribution in ACD and CARR modelling. By incorporating an additional shape parameter, the Weibull distribution is extended to the extended Weibull (EW) distribution to enhance its flexibility in the tails. An MCMC based sampling scheme under a Bayesian framework is employed for statistical inference and its performance is demonstrated in a simulation experiment. Empirical application is based on trade duration and daily range data from the Australian Securities Exchange (ASX). The performance of EW distribution, in terms of model fit, is assessed in comparison to two other frequently used error distributions, the exponential and Weibull distributions.

EC1472: **A new method for circadian gene identification using order restricted inference**

Presenter: **Yolanda Larriba**, Universidty of Valladolid, Spain

Co-authors: Cristina Rueda, Miguel Fernandez

Identification of periodic patterns in gene expression data is important for studying the regulation mechanism of the circadian system. However, the information available is often given by one or two cycles. Consequently, the number of observations is not enough to fit certain models, such as Fouriers models. Some authors have yet developed procedures or algorithms among which is the JTK Cycle Algorithm. We propose a new method to address this question based on order restricted inference, which allows to determine, in terms of an Euclidean or circular order, if the gene expression given is or not cyclic. Validation of the method is made by evaluating of real data sets and simulations. Moreover, we compare the results obtained by the method with others detecting methods developed in the literature, mainly with the JTK Cycle Algorithm.

Sunday 13.12.2015 16:40 - 18:20 Parallel Session J – CFE-CMStatistics

CO458 Room MAL G15 MODELLING AND FORECASTING CYCLICAL FLUCTUATIONS I Chair: Gian Luigi Mazzi

CO0243: **The Great Moderation in historical perspective: Is it that great?**
Presenter: **Lola Gadea**, University of Zaragoza, Spain
The Great Moderation (GM) is widely documented in the literature as one of the most important changes in the US business cycle. All the papers that analyze it use post WWII data. For the first time we place the GM in a long historical perspective, stretching back a century and a half, which includes secular changes in the economic structure and a substantial reduction of output volatility. We find two robust structural breaks in volatility at the end of WWII and in the mid-eighties, showing that the GM still holds in the longer perspective. Furthermore, we show that GM volatility reduction is only linked to expansion features. We also date the US business cycle in the long run, finding that volatility plays a primary role in the definition of the business cycle, which has important consequences for econometricians and forecasters.

CO0265: **The low-variance, high-risk economy: Lessons from the higher moments of MSI-VARs**
Presenter: **Alexander Karalis Isaac**, Warwick, United Kingdom
The aim is to determine whether Markov-switching models capture the non-Gaussian features of economic data evident since the Financial Crisis. We derive exact solutions for the for third and fourth moments of MSI-VARs under mean square stability. This allows us to model the Financial Crisis and the Great Moderation in a single framework. For U.S. data, the post 1983 business cycle describes a low-variance, high-risk economy, with skewness -1.1 and kurtosis 6.6. A Markov-switching model with four states splits the sample irreversibly in 1983 and captures the new moment structure. This enables economists to model both the asymmetry and probability of rare disasters in GDP growth, consistent with data generated in the era of global financial liberalisation.

CO0705: **Nested dynamic factor modeling: A coherent approach to measure national and state coincident indexes**
Presenter: **Juan-Carlos Martinez-Ovando**, ITAM, Mexico
Dynamic factor models have been used as a workhorse to measure business cycles from several economic information. However, when the economic information is available at aggregated and disaggregated levels (state or sectorial), the computations derived from this methodology exhibit some sorts of inconsistencies. A solution to that problem was proposed previously by deriving an ad-hoc procedure to consistently measure coincident indexes for the 50 states of the US economy. We develop an alternative procedure based on the notion of nested dynamic factor model, i.e. a dimensional reduction technique which takes into consideration the information contained in the coincident economic information for the states' economies and the aggregate, simultaneously. Our procedure, in this way, generalizes the approach previously adopted, and allows us to provide a coherent reading of local and aggregated business cycles. We illustrate our proposal by means of computing coherent national and states coincident indexes for the US and Mexico.

CO0854: **Combining composite indicators and advanced graphical tools for monitoring Euro area and member states cycles**
Presenter: **Gian Luigi Mazzi**, Eurostat, Luxembourg
Co-authors: Jacques Anas, Monica Billio, Ludovic Cales
Since several years, Eurostat is monitoring the cyclical situation of the Euro area and its largest economies by means of cyclical composite indicators. Such indicators based on MS-VAR models aim to simultaneously detect peaks and troughs of the growth and business cycles within the so-called ABCD sequence. Furthermore, at the Euro area level, also the acceleration cycle is monitored by means of a univariate MS model. Firstly we present the preliminary results of a project targeting a full coverage monitoring of the Euro area cycles, obtained by developing composite indicators, similar to those already in use, to all Euro area member countries plus the UK. Problems encountered in constructing such indicators, especially due to data availability, are analysed and related solutions are presented. Secondly we show how the results of the cyclical composite indicators can be presented in an intuitive, easy to read and friendly graphical representation. The core of such a graphical tool is constituted by a clockwise representation of the cyclical fluctuations. The characteristics of the tool are presented and some examples are proposed to show the potentials of the tool from the analysts' point of view.

CO562 Room MAL B20 RECENT ADVANCES IN BAYESIAN COMPUTATIONAL METHODS Chair: Gael Martin

CO0295: **Fast and efficient MCMC for large data problems using data subsampling and the difference estimator**
Presenter: **Matias Quiroz**, Stockholm University and Sveriges Riksbank, Sweden
Co-authors: Mattias Villani, Robert Kohn
The aim is to propose a generic Markov Chain Monte Carlo (MCMC) algorithm to speed up computations for datasets with many observations. A key feature of our approach is the use of the highly efficient difference estimator from the survey literature to estimate the log-likelihood accurately using only a small fraction of the data. Our algorithm improves on the $O(n)$ complexity of regular MCMC by operating over local data clusters instead of the full sample when computing the likelihood. The likelihood estimate is used in a Pseudo-marginal framework to sample from a perturbed posterior which is within $O(m^{-1/2})$ of the true posterior, where m is the subsample size. The method is applied to a logistic regression model to predict firm bankruptcy for a large data set. We document a significant speed up in comparison to the standard MCMC on the full dataset.

CO1282: **Accelerating Metropolis-Hastings algorithms by delayed acceptance**
Presenter: **Christian Robert**, Universite Paris-Dauphine, France
Co-authors: Marco Banterle, Clara Grazian, Anthony Lee
MCMC algorithms such as Metropolis-Hastings algorithms are slowed down by the computation of complex target distributions as exemplified by huge datasets. We offer a useful generalisation of the Delayed Acceptance approach, devised to reduce the computational costs of such algorithms by a simple and universal divide-and-conquer strategy. The idea behind the generic acceleration is to divide the acceptance step into several parts, aiming at a major reduction in computing time that out-ranks the corresponding reduction in acceptance probability. Each of the components can be sequentially compared with a uniform variate, the first rejection signalling that the proposed value is considered no further. We develop moreover theoretical bounds for the variance of associated estimators with respect to the variance of the standard Metropolis-Hastings and detail some results on optimal scaling and general optimisation of the procedure.

CO0157: **On consistency of approximate Bayesian computation**
Presenter: **David Frazier**, Monash University, Australia
Co-authors: Gael Martin, Christian Robert
Approximate Bayesian computation (ABC) methods have become increasingly prevalent of late, facilitating as they do the analysis of intractable, or challenging, statistical problems. With the initial focus being primarily on the practical import of ABC, exploration of its formal statistical properties has begun to attract more attention. The aim is to establish general conditions under which ABC methods are Bayesian consistent, in the sense of producing draws that yield a degenerate posterior distribution at the true parameter (vector) asymptotically (in the sample size). We

