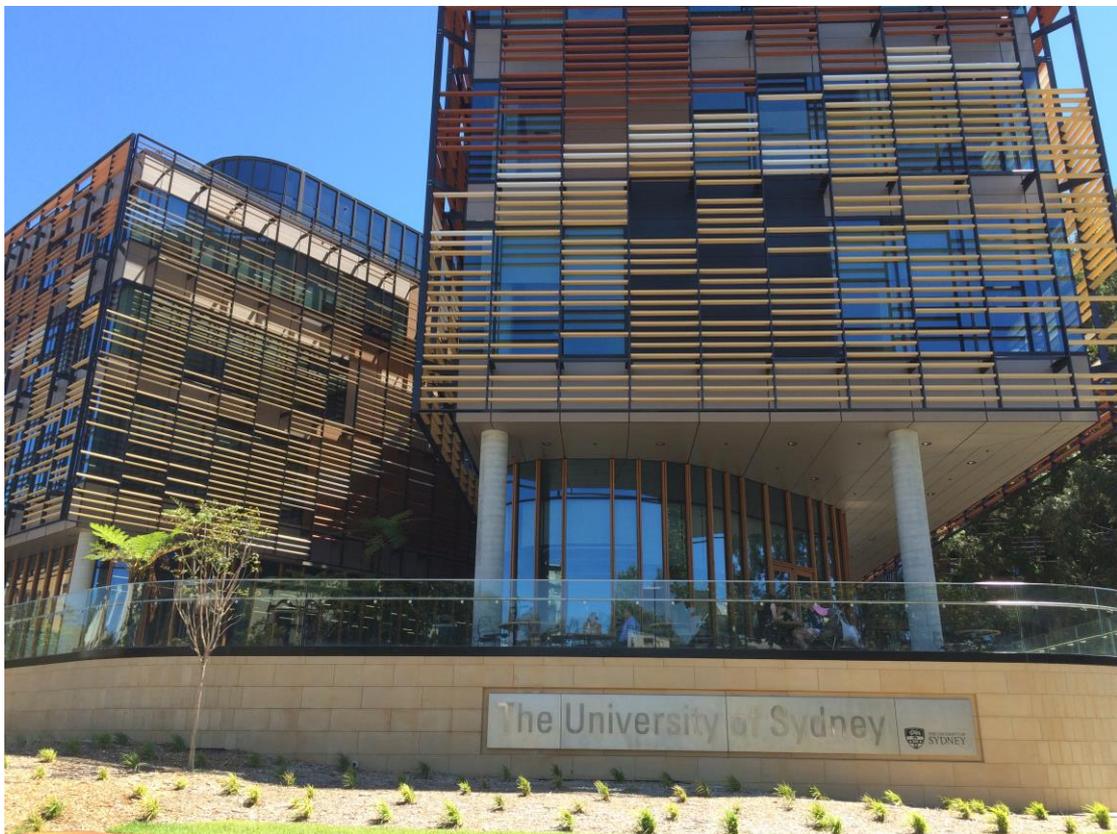THE UNIVERSITY OF
SYDNEY
—
Business School

Time Series and Forecasting Symposium
TSF2017

30 November-1 December 2017

Room 3310
Level 3, Abercrombie Building (H70)
Corner of Abercrombie Street and Codrington Street
The University of Sydney Business School
Map   **Parking**   **Public Transport**

Time Series and Forecasting Research Group

THE UNIVERSITY OF
SYDNEY
—
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Discipline of Business Analytics, The University of Sydney Business School

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Curtin Business School, Curtin University

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Program

8.45am-9.00am- **Registration**

9.00am-10.30am	Welcome and Keynote Address
9.00am-9.15am	**Welcome -** **Professor Richard Gerlach** (The University of Sydney Business School)
9.15am-10.30am	**Keynote Address -** 'Model Diagnostics in Time Series Regression Models' **Professor Javier Hidalgo** (London School of Economics)

10.30-11.00am- **Morning Tea**

11.00am-12.30pm	Session 1 – Econometrics Session Chair: **Dr Peter Exterkate** (The University of Sydney)
11.00am-12.00pm	**Invited Talk -** 'Bayesian Inference for Structural Vector Autoregressions with Markov-Switching Heteroskedasticity' **Dr Tomasz Wozniak** (The University of Melbourne)
12.00pm-12.30pm	**Contributed Talk -** 'Nonparametric Inference on the Self-Excitation of Jumps in Jump Diffusion Model' **Dr Simon Kwok** (The University of Sydney)

12.30pm-1.30pm **Lunch**

1.30pm-3.00pm	**Session 2 – Volatility and Tail Risk Forecasting** Session Chair: **Dr Chao Wang** (The University of Sydney)
1.30pm-2.00pm	**Contributed Talk -** 'Conditional Volatility Persistence' **Associate Professor Jianxin Wang** (University of Technology Sydney)
2.00pm-2.30pm	**Contributed Talk -** 'Inversion Copulas for Realized GARCH Models' **Professor Richard Gerlach** (The University of Sydney)
2.30pm-3.00pm	**Contributed Talk -** 'Bayesian Semi-parametric Quantile Regression Models for Tail Risk Forecasting Incorporating Realized Measures' **Dr Chao Wang** (The University of Sydney)

3.00pm-3.30pm - **Afternoon Tea**

PARALLEL SESSIONS

3.30pm-5.00pm	**Session 3A – MCMC (Room 3310)** Session Chair: **Dr David Gunawan** (The University of New South Wales)
3.30pm-4.00pm	**Contributed Talk -** 'An Application of the Multivariate Modified-t Distribution to Bayesian Seemingly Unrelated Regression Models' **Mr Charles Au** (The University of Sydney)
4.00pm-4.30pm	**Contributed Talk -** 'Gaussian variational approximation for high-dimensional state space models' **Mr Matias Quiroz** (The University of New South Wales)
4.30pm-5.00pm	**Contributed Talk -** 'On general sampling schemes for Particle Markov chain Monte Carlo methods' **Dr David Gunawan** (The University of New South Wales)

3.30pm-5.00pm	**Session 3B – Time Series I (Room 3280)** Session Chair: **Mr Richard Hunt** (The University of Sydney)
3.30pm-4.00pm	**Contributed Talk -** 'An Introduction to Vector Gegenbauer Process with Long Memory' **Ms Hao (Helen) Wu** (The University of Sydney)
4.00pm-4.30pm	**Contributed Talk -** 'A New Look at Gegenbauer Long Memory Processes' **Mr Richard Hunt** (The University of Sydney)
4.30pm-5.00pm	**Contributed Talk -** 'Change-Point Detection in Time Series Data' **Dr Georgy Sofronov** (Macquarie University)

Friday, 1 December 2017
9.00am-9.15am- **Registration**

9.15am-10.30am	Plenary Speaker
9.15am-10.30am	'The Shifting Seasonal Mean Autoregressive Model and Seasonality in the Central England Monthly Temperature series 1772-2016' **Professor Timo Teräsvirta** (Aarhus University)

10.30am-11.00am- **Morning Tea**

11.00am-12.30 pm	Session 4 – Copulas Session Chair: **Professor Richard Gerlach** (The University of Sydney)
11.00am-12.00pm	**Invited Talk -** 'Bayesian Inference for the Dynamic Factor Copula Model **Dr Anastasios Panagiotelis** (Monash University)
12.00am-12.30pm	**Contributed Talk -** 'A Nonparametric Copula Approach to Conditional Value-at-Risk' **Dr Gery Geenens** (The University of New South Wales)

12.30-1.30pm- **Lunch**

1.30pm-3.00pm	Session 5 – Forecasting Session Chair: **Associate Professor Felix Chan** (Curtin University)
1.30pm-2.00pm	**Contributed Talk -** 'Optimal Combination of Forecasts under Mean Absolute Deviation' **Dr Laurent Pauwels** (The University of Sydney)
2.00pm-2.30pm	**Contributed Talk -** 'A Regime-switching Stochastic Volatility Model for Forecasting Electricity Prices' **Dr Peter Exterkate** (The University of Sydney)
2.30pm-3.00pm	**Contributed Talk-** 'Event Count Estimation' **Associate Professor Felix Chan** (Curtin University)

3.00pm-3.30pm- **Afternoon Tea**

PARALLEL SESSIONS

3.30pm-5.00pm	Session 6A – Time Series II (Room 3310) Session Chair: Mr Gemie Nitithumbundit (The University of Sydney)
3.30pm-4.00pm	**Contributed Talk -** 'Incremental Factor Model for High Frequency Observations with Large Dimension and Long Span' **Dr Ye Lu** (The University of Sydney)
4.00pm-4.30pm	**Contributed Talk -** 'Adaptive Wavelet Estimation of a Function from an *m*-dependent Process with Possibly Unbounded *m*' **Dr Hassan Doosti** (Macquarie University)
4.30pm-5.00pm	**Contributed Talk -** 'Modelling Multivariate Financial Time Series with Variance Gamma innovations' **Mr Gemie Nitithumbundit** (The University of Sydney)

3.30pm-4.30pm	Session 6B- Discrete Data (Room 3280) Session Chair: Dr Laurent Pauwels (The University of Sydney Business School)
3.30pm-4.00pm	**Contributed Talk-** 'Alternative Parameterisations of the Poisson Common Factor Model for Modelling Mortality Jointly for Both Sexes' **Miss Sixian (Alice) Tang** (Macquarie University)
4.00pm-4.30pm	**Contributed Talk-** 'On the Use of Multi-Population Mortality Projection Models for Deprivation Subgroups within a Population **Mr Kenny Mok** (Macquarie University)

5.00pm-5.15pm - **Symposium Close**

List of Abstracts

Presenter: Javier Hidalgo, Department of Economics, LSE, UK
Title: Model Diagnostics in Time Series Regression Models

Abstract:
This manuscript has two main aims. Firstly we round off the study of model diagnostics testing for regression models using partial sums empirical methodology when data exhibits either long memory (LM) or short memory (SM) dependence. We show that once we allow the data to exhibit possibly LM dependence, it has some interesting consequences on the statistical behaviour of the test and their properties can be qualitatively very different to those obtained under SM dependence. For instance, the asymptotic behaviour of the test is qualitatively very different depending on whether the regression model under the null hypothesis is a nonlinear or a linear function, and in the latter case if the model has an intercept or not. Another surprising result is that the tests may depend on whether the covariates are or are not Gaussian. Our second aim of the paper is to describe a bootstrap, contrary to the sieve bootstrap, valid under either LM or SM dependence. One of the reason of the failure of the sieve bootstrap in our context is that under LM dependence, the sieve bootstrap is not able to capture the true covariance structure of the original data. The motivation of the bootstrap is due to the intractable limiting distribution of the test.

Presenter: Tomasz Wozniak, Department of Economics, University of Melbourne
Title: Bayesian Inference for Structural Vector Autoregressions with Markov-Switching Heteroskedasticity
Co-author: Helmut Lütkepohl

Abstract:
In order to identify structural shocks that affect economic variables, restrictions need to be imposed on the parameters of structural vector autoregressive (SVAR) models. Economic theory is the primary source of such restrictions. However, only over-identifying restrictions can be tested with statistical methods which limit the statistical validation of many just-identified SVAR models. In this study, Bayesian inference is developed for SVAR models in which the structural parameters are identified via heteroskedasticity. In such a model, the restrictions that are just-identifying in the homoskedastic case, become over-identifying and can be tested. A set of parametric restrictions is derived under which the contemporaneous effects matrix is unique and a Savage-Dickey density ratio is used to assess the validity of the uniqueness restrictions. For that purpose, a new probability distribution is defined that generalizes the beta, F, and compound gamma distributions. As an empirical example, monetary models are compared using heteroskedasticity as an additional device for identification. The empirical results support models with money in the monetary policy reaction function.

Presenter: Simon Kwok, School of Economics, USYD
Title: Nonparametric Inference on the Self-Excitation of Jumps in Jump Diffusion Model

Abstract:
Understanding the jump dynamics of market prices is important for derivative pricing and risk management. Despite their analytical tractability, parametric jump diffusion models entail restrictive and unrealistic structure on the jump dynamics. In this paper, I propose a set of nonparametric estimator for jump autocorrelation associated with different powers of the log-return process. The nonparametric estimator is consistent for the jump autocorrelation measure and asymptotically normal under mild moment and stationarity conditions. This enables pointwise inference through the construction of jump auto-correlogram with confidence bounds. Furthermore, I study an omnibus test for no self-excitation of jumps at all positive lag orders. The method is naturally extendable to the inference of cross-correlation of jumps in a bivariate setting. In an empirical study of jump contagion in stock markets, I found richer jump dynamic structure that is different from what was implied from conventional jump diffusion models in the literature.

Presenter: Jianxin Wang, University of Technology Sydney
Title: Conditional Volatility Persistence
Co-author: Minxian Yang

Abstract:
This study presents new evidence on the determinants of daily volatility persistence. We study a model of volatility dynamics where volatility persistence is conditional on market return and volatility. We show that daily volatility persistence increases with daily returns, especially negative returns. Contrary to common perception, volatility level is found to have a negative effect on daily volatility persistence. Our findings also offer a new explanation for the asymmetric return impact on volatility. Our model with conditional volatility persistence provides significant improvements in volatility forecasts relative to several recent models of volatility dynamics.

Presenter: Richard Gerlach, Discipline of Business Analytics, USYD
Title: Inversion Copulas for Realized GARCH Models
Co-authors: Michael Smith and Ole Maneesoonthorn

Abstract:
Inversion copulas show promise in modelling latent nonlinear state space models with Markov dependence structures. We extend this idea to cover nonlinear time series with non-Markov dependence, with focus on two special cases: the well-known GARCH and Realized GARCH specifications. Both present challenges in finding and evaluating the implied margin of the latent variable: we discuss some possible solutions here. Likelihood and Bayesian computational methods are derived for estimation, inference and forecasting purposes. The sampling properties of these estimators are illustrated via a simulation study. The two new time series inversion copula models are used to model and forecast financial returns from several financial indices, including an emerging markets index and a gold and silver index. The proposed models are competitive for density and tail risk forecasting in these series, compared to a range of popular, competing financial time series models.

Presenter: Chao Wang, Discipline of Business Analytics, USYD
Title: Bayesian Semi-parametric Quantile Regression Models for Tail Risk Forecasting Incorporating Realized Measures
Co-author: Richard Gerlach

Abstract:
The joint Value at Risk (VaR) and expected shortfall (ES) CAViaR models are extended by incorporating various realized measures (e.g. Realized Variance and Realized Range), as potentially more efficient series of information than daily returns. Further, sub-sampling and scaling methods are applied to both the realized range and realized variance, to help deal with inherent micro-structure noise and inefficiency. An adaptive Bayesian Markov Chain Monte Carlo method is developed and employed for estimation and forecasting, whose properties are assessed and compared with maximum likelihood, via a simulation study. In a real forecasting study applied to 7 market indices and 2 individual asset returns, compared to a range of parametric, non-parametric and semi-parametric models, including GARCH, Realized-GARCH, CARE and the original joint VaR and ES CAViaR models, one-day-ahead Value-at-Risk and Expected Shortfall forecasting results favor the proposed models, especially when incorporating the Realized Range and the sub-sampled Realized Range as the realized measure in the model.

Presenter: Charles Au, Discipline of Business Analytics, USYD
Title: An Application of the Modified Multivariate Student-*t* Distribution to Bayesian Seemingly Unrelated Regression Models
Co-author: Boris Choy

Abstract:
This paper proposes to apply Bayesian seemingly unrelated regression models with the modified multivariate Student-*t* (Mod-*t*) error distribution to improve model fit for robustness considerations. Such models could capture the correlation structure between several regression equations as well as flexibly model the heavy-tailedness of the error terms. The non-elliptical Mod-*t* distribution allows the degrees of freedom parameters of each of its marginal Student-*t* distribution to be different. This overcomes the limitation of the multivariate Student-*t* distribution that these parameters need to be identical. Since the Mod-t distribution can be expressed via the scale mixtures of normal representation but not in closed form, the Bayesian Markov chain Monte Carlo (MCMC) approach is used for conducting statistical inference. The SUR model with the Mod-*t* error distribution will be applied to retail sales data from the Dominick's Finer Foods database. The performance of this model will be compared to SUR models with other error structures, including the Gaussian and Student-*t* copulas.

Presenter: Matias Quiroz, School of Economics, UNSW
Title: Gaussian Variational Approximation for High-dimensional State Space Models
Co-authors: David Nott and Robert Kohn

Abstract:
Variational approximation methods formulate posterior computation in Bayesian inference as an optimization problem. In this article, multivariate Gaussian approximations to the posterior are considered, in which the variational parameters to be optimized are a mean vector and a covariance matrix. The number of parameters in the covariance matrix grows as the square of the number of model parameters, so it is necessary to find simple and expressive parametrizations of the covariance structure when the number of model parameters is large. This is considered here for state space models with a high-dimensional state vector. The joint posterior distribution over the state vectors is approximated using a dynamic factor model, with Markovian dependence in time and a factor covariance structure for the states. This gives a reduced dimension description of the dependence structure for the states, while using a temporal conditional independence structure similar to that in the true posterior. We illustrate our approach in a spatiotemporal model for the spread of the Eurasian Collared-Dove across North America.

Presenter: David Gunawan, School of Economics, UNSW
Title: On General Sampling Schemes for Particle Markov Chain Monte Carlo methods
Co-authors: Eduardo F. Mendes, Christopher K. Carter and Robert Kohn

Abstract:
Particle Markov Chain Monte Carlo methods (PMCMC) are used to carry out inference in non-linear and non-Gaussian state space models, where the posterior density of the states is approximated using particles. Current approaches usually carry out Bayesian inference using a particle Marginal Metropolis-Hastings algorithm (PMMH), a particle Gibbs sampler (PG), or a particle Metropolis within Gibbs sampler (PMwG). Our article gives a general approach for constructing sampling schemes that converge to target distributions given in the literature. Our approach shows how the three ways of generating variables mentioned above can be combined flexibly. The advantage of our general approach is that the sampling scheme can be tailored to obtain good results for different applications. We investigate the properties of the general sampling scheme, including conditions for uniform convergence to the posterior. We illustrate our methods with examples of state space models where one group of parameters can be generated in a straightforward manner in a PG step by conditioning on the states, and a second group of parameters are generated without conditioning on the states because of the high dependence between such parameters and the states.

Presenter: Hao (Helen) Wu, School of Mathematics & Statistics, The University of Sydney
Title: An Introduction to Vector Gegenbauer Process with Long Memory
Co-author: Shelton Peiris

Abstract:
In this talk we consider a flexible new class of time series models generated by vector Gegenbaur autoregressive moving average (VEGARMA) structure. VEGARMA process can be regarded as a more general class of multivariate long memory time series and supersedes the family of VARFIMA. We establish the existence and uniqueness of second order solutions under certain regularity conditions. We develop a number of results associated with this new class and considers the estimation of parameters in detail. The state space form of the VAR and VMA approximation is developed and estimates are obtained by QMLE using the Kalman filter. Following Monte Carlo experiment, we provide empirical evidence that supports parsimonious versions of the model in applications.

Presenter: Richard Hunt, School of Mathematics and Statistics, The University of Sydney
Title: A New Look at Gegenbauer Long Memory Processes
Co-authors: Shelton Peiris and Neville Weber

Abstract:
In this presentation we will look at Long Memory and Gegenbauer Long Memory processes, and methods for estimation of the parameters of these models. We will introduce a new method for the estimation of almost all the parameters of a k-factor Gegenbauer/GARMA process. The method essentially attempts to find parameters for the spectral density to ensure it most closely matches the (smoothed) periodogram. Simulations indicate that the new method has a similar level of accuracy to existing methods (Whittle, Conditional Sum-of-squares), but can be evaluated considerably faster, whilst making few distributional assumptions on the data.

Presenter: Georgy Sofronov, Department of Statistics, Macquarie University
Title: Change-Point Detection in Time Series Data
Co-author: Lijing Ma

Abstract:
In time series analysis, it is essential to check whether the observations are obtained by one or by several different mechanisms of data generation. In recent years, this problem, which is known as a change-point (or break-point) detection problem, has become a question of renewed interest for many researchers. Problems of this type arise in a wide range of applications, including financial time series analysis (e.g. changing volatility), signal processing (e.g. structural analysis of EEG signals), geology data analysis (e.g. analysis of volcanic eruption series) and environmental applications (e.g. detecting changes in ecological systems due to climatic conditions crossing some critical thresholds). In this talk we focus on detecting the changes in the mean level of autoregressive processes. We develop the Cross Entropy method for estimating the locations of change-points as well as parameters of the process in each segment. In order to identify the number of change-points, we use the Minimum Description Length information criterion.

Presenter: Timo Teräsvirta, Department of Economics and Business Economics, Aarhus University, Denmark
Title: The Shifting Seasonal Mean Autoregressive Model and Seasonality in the Central England Monthly Temperature series 1772-2016
Co-authors: Changli He and Jian Kang

Abstract:
In this paper we introduce a new model, the Shifting Seasonal Mean Autoregressive Model, in which the seasonal dummy variables have deterministically time-varying coefficients. Seasonal error variances are also assumed time-varying. Asymptotic properties of maximum likelihood estimators of the parameters of the model are considered. Tests of constancy of coefficients of seasonal dummy variables against shifts in them are derived. Misspecification tests of the estimated model are discussed as well. The model is applied to describing variations in seasonality of the monthly Central England temperature series, studied by many authors, including Proietti and Hillebrand (2017). Results show, among other things, that there are three types of warming, tentatively named 19th century and 20th century warming, and no warming, respectively.

Presenter: Anastasios Panagiotelis, Department of Econometrics and Business Statistics, Monash University
Title: Bayesian Inference for the Dynamic Factor Copula Model
Co-authors: Ban Kheng Tan and George Athanasopoulos

Abstract:
We develop efficient Bayesian inference for the one factor copula model with two significant contributions over existing methodologies. First, our approach leads to straightforward inference on dependence parameters and the latent factor; only inference on the former is available under frequentist alternatives. Second, we develop a reversible jump Markov chain Monte Carlo algorithm that averages over models constructed from different bivariate copula building blocks. Our approach accommodates any combination of discrete and continuous margins. Through extensive simulations, we compare the computational and Monte Carlo efficiency of alternative proposed sampling schemes. The preferred algorithm provides reliable inference on parameters, the latent factor and model space. The potential of the methodology is highlighted in an empirical study of ten binary measures of socio-economic deprivation collected for 11463 East Timorese households. We also discuss recent extensions to dynamic factor copula models.

Presenter: Gery Geenens, School of Mathematics and Statistics, UNSW
Title: A Nonparametric Copula Approach to Conditional Value-at-Risk
Co-author: Richard Dunn

Abstract:
Value-at-Risk and its conditional allegory, taking into account the available information about the economic environment, form the centerpiece of the Basel framework for the evaluation of market risk in the banking sector. In light of this importance, a nonparametric framework for estimating this conditional Value-at-Risk is presented. A nonparametric approach is particularly pertinent as the traditionally used parametric distributions have been shown to be insufficiently robust and flexible in the equity-return data sets of interest. The method extracts the quantile of the conditional distribution of interest, whose estimation is based on a novel estimator of the copula density. Simulations and a real-world back-testing analysis demonstrate that the posed estimator may be superior to its industry counterparts.

Presenter: Laurent Pauwels, Discipline of Business Analytics, USYD
Title: Optimal Combination of Forecasts under Mean Absolute Deviation
Co-author: Felix Chan

Abstract:
This paper presents theoretical motivations for combining forecasts optimally under the Mean Absolute Deviation (MAD) criterion. While the literature has covered extensively the optimal combination of forecasts under Mean Squared Errors (MSE) theoretically and empirically, it is sparse with respect to MAD. The paper demonstrates that the optimisation problem for MAD yield the same solutions as the optimisation problem for MSE under an affine constraint and provided that the sample is large. Furthermore, the paper provides a set of conditions for which the simple average is the optimal weight. Simulation studies support the theoretical results and show their relevance when combining a large number of forecasts and/or for large samples.

Presenter: Peter Exterkate, School of Economics, The University of Sydney
Title: A Regime-switching Stochastic Volatility Model for Forecasting Electricity Prices
Co-author: Oskar Knapik

Abstract:
In a recent review paper (Weron, 2014, International Journal of Forecasting), several crucial challenges outstanding in the area of electricity price forecasting are pinpointed. The aim of this paper is to address all of them by (i) showing the importance of considering fundamental price drivers in modeling, (ii) developing new techniques for density forecasting of electricity prices, and (iii) introducing a universal Bayesian technique for model comparison to this literature. We propose a new regime-switching stochastic volatility model with three regimes (negative jump or "drop", normal price or "base", positive jump or "spike") where the transition matrix depends on explanatory variables in a novel way, using an underlying ordered probit model. In an application to one-day-ahead density forecasting of hourly prices in the Nord Pool intraday electricity market, we show that the proposed model outperforms several benchmark models at this task.

Presenter: Felix Chan, Curtin Business School, Curtin University
Title: Event Count Estimation
Co-authors: Laszlo Balazsi and Laszlo Matyas

Abstract:
This paper proposes a new estimation procedure called Event Count Estimator (ECE). The estimator is easy to carry out and is robust against outliers, censoring and "excess" zeros" in the data. The paper establishes asymptotic properties of the new estimator and the theoretical results are supported by several Monte Carlo experiments. Monte Carlo experiments also show that the estimator has reasonable properties in moderate to large samples. As such, the cost of inefficiency for robustness is negligible from an applied viewpoint. The practical usefulness of the new estimator is demonstrated via an empirical application of Gravity Model of trade.

Presenter: Ye Lu, School of Economics, The University of Sydney
Title: Incremental Factor Model for High Frequency Observations with Large Dimension and Long Span

Abstract:
This paper develops the methodology and asymptotic theory of the incremental factor model for high frequency observations with large cross section over long time span, and the analysis is under a continuous time framework. Our model allows for heterogeneous factors in both magnitude and strength, while also considers separating diffusive and jump factors. Under this general setting, we show how to determine the number of factors, and how to extract and interpret them. Our asymptotics involves three parameters, the cross-sectional dimension N, the time span T and the sampling interval δ, and it is developed under the assumption that $\delta \to 0$ as $N, T \to \infty$. This three-dimensional asymptotic theory is therefore useful to analyze the growing high frequency data with both cross-sectional and time series dimensions being large. As an empirical application, we study the factor structure of 748 daily returns from stocks traded on NYSE, NASDAQ and AMEX from 1989 to 2015.

Presenter: Hassan Doosti, Department of Statistics, Macquarie University
Title: Adaptive Wavelet Estimation of a Function from an *m*-dependent Process with Possibly Unbounded *m*

Abstract:
The estimation of a multivariate function from a stationary m-dependent process is investigated, with a special focus on the case where m is large or unbounded. We develop an adaptive estimator based on wavelet methods. Under flexible assumptions on the nonparametric model, we prove the good performances of our estimator by determining sharp rates of convergence under two kinds of errors: the pointwise mean squared error and the mean integrated squared error. We illustrate our theoretical result by considering the multivariate density estimation problem, the derivatives density estimation problem, the density estimation problem in a GARCH-type model and the multivariate regression function estimation problem.

Presenter: Gemie Nitithumbundit, School of Maths & Statistics, The University of Sydney
Title: Modelling Multivariate Financial Time Series with Variance Gamma innovations
Co-author: Jennifer S.K. Chan

Abstract:
Modelling multivariate financial time series returns data is challenging since it exhibits properties such as high kurtosis and slight skewness which cannot be captured using the normal distribution. On the other hand, the variance gamma (VG) distribution can capture these properties in a parsimonious way. In this talk, we propose the vector autoregressive moving average model with VG innovations to also capture the persistence from the autocorrelations and cross-correlations while also briefly explaining the unbounded likelihood problem related to the parameter estimation involving the VG distribution. The model is applied to multiple cryptocurrency returns.

Presenter: Sixian (Alice) Tang, Department of Applied Finance and Actuarial Studies, Macquarie University
Title: Alternative Parameterisations of the Poisson Common Factor Model for Modelling Mortality Jointly for Both Sexes
Co-authors: Kenneth Wong and Jackie Li

Abstract:
Recently, there have been increasing interests in developing mortality projection models which handle multiple populations jointly. We investigate the application of two alternative models modified from the Poisson common factor model (PCFM), which was proposed by Li (2013) for modelling and forecasting mortality of both genders jointly. One alteration allows a different number of sex-specific factors between both sexes (PCFM-VSF), which offers more flexibility to capture the potential discrepancies in mortality trends over time amongst the two sexes. The other alteration proposes a common age effect (PCFM-CAE) shared by both sexes, which could provide a more parsimonious model structure in some cases. In this paper, we test the two modified models and compare them with the original PCFM regarding the goodness-of-fit and forecast accuracy, using mortality data from six countries. Model fitting is assessed in terms of the BIC (Bayesian Information Criterion) values and residuals patterns, and forecast accuracy is examined via backtesting to compare the projected values against the actual data. We use weakly stationary autoregressive processes to perform the projection. Our numerical results demonstrate that the two extended models produce superior fitting performances over the baseline model. However, the extent of improvement in forecasting depends on the split point between the sample and projection periods in the backtesting process.

Presenter: Kam Kuen (Kenny) Mok, Department of Applied Finance and Actuarial Studies, Macquarie University
Title: On the Use of Multi-Population Mortality Projection Models for Deprivation Subgroups within a Population
Co-author: Jackie Li

Abstract:
Continual improvements in mortality have caused significant attention on the sustainability of payments of pensions from governments and annuities from insurers. Most work in the literature so far focus on modelling the subgroups within a population separately or the entire population as a whole. But there are many other situations where it is more suitable to co-model demographically related populations, for instance, producing more accurate projections, tackling a small dataset, or calculating the hedge effectiveness in an index-based hedge. In this paper, we examine the use of a range of multi-population mortality projection models with very different features. We apply these models to the English population data collected from the Human Mortality Database (HMD) and the deprivation subgroups data in England obtained from the Office for National Statistics (ONS), using a range of time series processes including the univariate and multivariate random walk, integrated autoregressive models, and gravity model. We adopt a series of testings to compare their performances including the goodness-of-fit, residuals patterns, and out-of-sample analysis. Moreover, we investigate the effectiveness of an index-based longevity hedge under each model's assumptions and implications, and discover that the time series modelling assumption is a significant factor in determining the hedging effectiveness.

List of Participants

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WiFi Instructions

Step 1: Enable wireless on your device and select the network UniSydney-Guest

Step 2: Open your browser. You will be automatically directed to a login page

Step 3: Enter the username **TSF2017** and password **16180926**