

Fourth Meeting of the  
Sydney Econometrics Research Group

School of Economics  
University of Sydney

27–28 September 2017

Programme and Book of Abstracts

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Wednesday, 27 September

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- 09:00 – 09:15 Opening remarks
- 09:15 – 10:30 Keynote address: Graham Elliott, University of California, San Diego  
“Testing for a trend with persistent errors”
- 10:30 – 11:00 Morning tea
- 11:00 – 11:45 Shuping Shi, Macquarie University  
“Detecting financial collapse and ballooning sovereign risk”
- 11:45 – 12:30 Parinaz Ezzati, University of Sydney  
“Analysis of volatility spillover effects:  
Two-stage procedure based on a modified GARCH-M”
- 12:30 – 14:00 Lunch
- 14:00 – 14:45 Minxian Yang, University of New South Wales  
“Inference in partially identified heteroskedastic simultaneous equations models”
- 14:45 – 15:30 Qiyang Wang, University of Sydney  
“Functional-coefficient cointegrating regression with endogeneity”
- 15:30 – 16:00 Afternoon tea
- 16:00 – 16:45 Joshua Chan, University of Technology Sydney  
“Large Bayesian VARs: A flexible Kronecker error covariance structure”
- 16:45 – 17:30 Peter Exterkate, University of Sydney  
“A regime-switching stochastic volatility model for forecasting electricity prices”
- 18:00 – 21:00 Workshop dinner at “Thai Pothong”, 294 King Street, Newtown
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Thursday, 28 September

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- 09:00 – 09:45 Ming He, University of Technology Sydney  
“Optimal budget allocation to social treatment programs”
- 09:45 – 10:30 Simon Kwok, University of Sydney  
“Difference-in-differences when trends are uncommon and stochastic”
- 10:30 – 11:00 Morning tea
- 11:00 – 11:45 Yi Sun, University of Sydney  
“Inference in moment inequality models with combined data sources”
- 11:45 – 12:30 Artem Prokhorov, University of Sydney  
“Consistent estimation of linear regression models using matched data”
- 12:30 – 14:00 Lunch
- 14:00 – 14:45 Ye Lu, University of Sydney  
“Testing for stationarity at high frequency”
- 14:45 – 15:30 Rami Tabri, University of Sydney  
“An improved bootstrap test for restricted stochastic dominance”
- 15:30 – 15:45 Closing remarks
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All sessions will be held in Lecture Room 5 (also known as Room 277) on the second floor of the Merewether Building. Morning tea, lunch, and afternoon tea will be served in the Common Room (Room 328) on the third floor of the same building.

### **Testing for a trend with persistent errors**

*Graham Elliott (University of California, San Diego)*

We develop new tests for the coefficient on a time trend in a regression of a variable on a constant and time trend where there is potentially strong serial correlation. This serial correlation can also include a unit root. We obtain tests under two different assumptions on the initial value for the stochastic component of the variable being examined, either this being zero asymptotically (as in previous examinations of this hypothesis) and also allowing the initial condition to be drawn from its unconditional distribution. We find that statistics perform better under the second of these assumptions, which is the more natural assumption to make.

### **Detecting financial collapse and ballooning sovereign risk**

*Peter C.B. Phillips (Yale University) and Shuping Shi (Macquarie University)*

This paper proposes a model for capturing discontinuities in the underlying financial environment that can lead to abrupt falls, but not necessarily sustained falls, in asset prices. This notion of price dynamics is consistent with existing understanding of market crashes, which allows for a mix of market responses that are not universally negative. In particular, the model is capable of generating realistic patterns of price meltdowns and bond yield inflations that constitute major market reversals while not necessarily being always monotonic in form. The recursive and moving window methods developed in Phillips, Shi and Yu (2015, PSY), which were designed to detect exuberance in financial and economic data, are shown to have detective capacity for such meltdowns and expansions. This characteristic of the PSY tests has been noted in earlier empirical studies by the present authors and other researchers but no analytic reasoning has yet been given to explain why methods intended to capture the expansionary phase of a bubble may also detect abrupt and broadly sustained collapses. The present paper develops a model and asymptotic theory that together explain this property of the PSY procedures. A pseudo real-time empirical analysis of European Union sovereign risk over the period running from January 2001 to September 2016 shows the effectiveness of this monitoring strategy in capturing key events and turning points in market risk assessment.

### **Analysis of volatility spillover effects: Two-stage procedure based on a modified GARCH-M**

*Parinaz Ezzati (University of Sydney)*

With the beginning of global financial integration in the mid-1980s, co-movements of volatilities were also observed. These co-movements suggest that financial markets' volatilities spillover from one market to another. This study has been undertaken to establish the soundness of this proposition, focusing on Iran, through an analysis of the international transmission of financial volatility movements. The analysis has been conducted using two stage procedure based on GARCH-M model; whilst data took the form of monthly financial returns derived from equity, money and foreign exchange markets of the selected countries. Results indicate existence of significant volatility interdependencies among Iranian financial markets within the Middle East and with the rest of the world.

### **Inference in partially identified heteroskedastic simultaneous equations models**

*Helmut Lutkepohl (DIW Berlin), George Milunovich (Macquarie University), Minxian Yang (University of New South Wales)*

Identification through heteroskedasticity in heteroskedastic simultaneous equations models (HSEMs) is considered. The possibility that heteroskedasticity identifies structural parameters only partially is explicitly allowed for. The asymptotic properties of the identified parameters are derived. Moreover, tests for identification through heteroskedasticity are developed and their asymptotic distributions are provided. Monte Carlo simulations are used to explore the small sample properties of the asymptotically valid methods. Finally, the approach is applied to investigate the relation between the extent of economic openness and inflation.

### **Functional-coefficient cointegrating regression with endogeneity**

*Han-Ying Liang (Tongji University), Yu Shen (Tongji University), Qiying Wang (University of Sydney)*

This paper explores nonparametric estimation of functional-coefficient cointegrating regression models where the structural equation errors are serially dependent and the regressor is endogenous. Generalizing earlier results by Wang and Phillips (2009b, 2016), the self-normalized local kernel and local linear estimators are shown to be asymptotic normal and to be pivotal upon an estimation of co-variances. Our new results open up inference by conventional nonparametric methods to a wide class of potentially nonlinear cointegrated relations.

### **Large Bayesian VARs: A flexible Kronecker error covariance structure**

*Joshua C.C. Chan (University of Technology Sydney)*

We introduce a class of large Bayesian vector autoregressions (BVARs) that allows for non-Gaussian, heteroscedastic and serially dependent innovations. To make estimation computationally tractable, we exploit a certain Kronecker structure of the likelihood implied by this class of models. We propose a unified approach for estimating these models using Markov chain Monte Carlo (MCMC) methods. In an application that involves 20 macroeconomic variables, we find that these BVARs with more flexible covariance structures outperform the standard variant with independent, homoscedastic Gaussian innovations in both in-sample model-fit and out-of-sample forecast performance.

### **A regime-switching stochastic volatility model for forecasting electricity prices**

*Peter Exterkate (University of Sydney) and Oskar Knapik (Aarhus University)*

In a recent review paper, Weron (2014) pinpoints several crucial challenges outstanding in the area of electricity price forecasting. This research attempts to address all of them by (i) showing the importance of considering fundamental price drivers in modelling, (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 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. The main focus of the paper is on short-term density forecasting in the Nord Pool intraday market. We show that the proposed model outperforms several benchmark models at this task, as measured by their predictive Bayes factors.

### **Optimal budget allocation to social treatment programs**

*Ming He (University of Technology Sydney) and Bin Peng (University of Bath)*

In this paper, we study the problem of allocating a limited budget to competing social treatment programs. The optimal budget allocation scheme is defined by an optimal splitting point that maximizes a social value function, weighted across different treatment programs. We propose estimators for the social value function and the optimal splitting point, and establish their asymptotic properties. Monte Carlo experiments are conducted to evaluate the finite sample performances of our estimators. We illustrate the usefulness of our framework and method by studying the optimal budget allocation among the treatment programs of providing subsidized long-lasting insecticide-treatment bed net in Kenya to fight malaria.

### **Difference-in-differences when trends are uncommon and stochastic**

*Marc K. Chan (University of Melbourne) and Simon Kwok (University of Sydney)*

We develop a linear two-step “difference-in-differences” (DID) estimator that is robust to uncommon and stochastic trends in the control and treatment groups. Our estimator is based on a panel data model with cross-sectional dependence, and is an extension of Pesaran (2006)’s common correlated effects (CCE) approach. We formally derive its consistency and asymptotic distribution under stationarity and nonstationarity as well as various cross-sectional (control and treatment) and time-series (pre- and post-intervention) dimensions. Simulation exercises demonstrate excellent performance of our estimator relative to existing methods. We present empirical results from microeconomic and macroeconomic applications. We apply our approach to monthly state-level welfare caseload data in the 1990s to estimate the effects of AFDC waivers. We show that simple DID yields spurious results due to strong stochastic trends in welfare caseloads and widely varying trends across states.

### **Inference in moment inequality models with combined data sources**

*Yi Sun (University of Sydney)*

In this paper, we study the estimation and inference problems for parameters when the data set is obtained by combining data from different sources. In the case where we want to estimate the means of random variables in our data set, we consider the set of estimators that are linear combinations of certain sample averages, and find that one estimator, defined to be the Adjusted estimator, that achieves the smallest possible asymptotic variance among all estimators in this set. In particular, the Adjusted estimator has smaller asymptotic variance than two commonly used estimators, the Short estimator and the Long estimator for the mean. Based on this result, we study inference problems in moment inequality models. We implement GMS procedure with three constructions of the sample moments: the Short, the Long and the Adjusted sample moments. We show that the resulting three GMS tests control asymptotic sizes. Based on local power analysis and simulations, we recommend using GMS with the Adjusted sample moments for better power.

### **Consistent estimation of linear regression models using matched data**

*Masayuki Hirukawa (Setsunan University) and Artem Prokhorov (University of Sydney)*

Economists often use matched samples, especially when dealing with earnings data where a number of missing observations need to be imputed. In this paper, we demonstrate that the ordinary least squares estimator of the linear regression model using matched samples is inconsistent and has a non-standard convergence rate to its probability limit. If only a few variables are used to impute the missing data, then it is possible to correct for the bias. We propose two semiparametric bias-corrected estimators and explore their asymptotic properties. The estimators have an indirect-inference interpretation and they attain the parametric convergence rate if the number of matching variables is no greater than three. Monte Carlo simulations confirm that the bias correction works very well in such cases.

### **Testing for stationarity at high frequency**

*Bibo Jiang (Fudan University), Ye Lu (University of Sydney), Joon Y. Park (Indiana University)*

This paper uses a novel continuous time framework to study testing for stationarity using high frequency observations. Our analysis shows that at high frequency, a commonly used stationarity test which relies on long run variance estimation does not have discriminatory power between stationary and nonstationary series if the bandwidth used in long run variance estimation is selected within the usual discrete time framework. In particular, the test is either inconsistent or rejects the null hypothesis of stationarity in probability 1 as sampling interval converges to 0. The latter property indicates that massive over rejection is likely to happen when high frequency observations are used. We propose using some continuous time bandwidth selection schemes in the long run variance estimation and show that the statistic employing the proposed schemes is consistent, not sensitive to sampling frequency and has the same asymptotic distribution as the one derived in the usual discrete time framework. However, our analysis also shows that the test, if being used as a residual based cointegration test, has an asymptotic distribution depending on nuisance parameter which makes asymptotic test infeasible. We propose using a modified subsampling method.

### **An improved bootstrap test for restricted stochastic dominance**

*Thomas M. Lok (University of Sydney) and Rami V. Tabri (University of Sydney)*

This paper proposes a method of bootstrap testing for restricted stochastic dominance between two income distributions. The proposed testing procedure retains the bootstrap test procedure of Linton, Song and Whang (2010) (LSW), but reformulates their bootstrap test statistics using an estimator of the contact set based on the method of constrained empirical likelihood that imposes the restrictions of the null hypothesis. This paper characterizes the set of probabilities in the null hypothesis so that the proposed test has asymptotically correct level, and the subsets of this set on which its asymptotic size is exactly equal to the nominal level. The testing procedure of this paper is less conservative than the one LSW propose. The proposed testing procedure is consistent and has the local asymptotic power identical to that for the LSW test under regularity conditions. Furthermore, we show that this equality of local asymptotic power functions does not reflect the relative behavior of the tests in large-samples, in which the proposed testing procedure can have strictly higher local power than the LSW test. For this reason, we also compare the tests using the notions of Pitman Efficiency and Deficiency, and Normalized Pitman Deficiency, and derive conditions under which the proposed test is superior to the LSW test. We report simulation results that show the proposed test is noticeably less conservative than the test of LSW and has improved power. Finally, the methods are illustrated in an assessment of consumption poverty in Australia for the periods 2001 and 2006.