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Modeling and Simulation: An Overview

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WORKING PAPER

No. 18/2013

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20 May 2013

Abstract: The papers in this special issue of *Mathematics and Computers in Simulation* cover the following topics: improving judgmental adjustment of model-based forecasts, whether forecast updates are progressive, on a constrained mixture vector autoregressive model, whether all estimators are born equal: the empirical properties of some estimators of long memory, characterising trader manipulation in a limit-order driven market, measuring bias in a term-structure model of commodity prices through the comparison of simultaneous and sequential estimation, modeling tail credit risk using transition matrices, evaluation of the DPC-based inclusive payment system in Japan for cataract operations by a new model, the matching of lead underwriters and issuing firms in the Japanese corporate bond market, stochastic life table forecasting: a time-simultaneous fan chart application, adaptive survey designs for sampling rare and clustered populations, income distribution inequality, globalization, and innovation: a general equilibrium simulation, whether exchange rates affect consumer prices: a comparative analysis for Australia, China and India, the impacts of exchange rates on Australia's domestic and outbound travel markets, clean development mechanism in China: regional distribution and prospects, design and implementation of a Web-based groundwater data management system, the impact of serial correlation on testing for structural change in binary choice model: Monte Carlo evidence, and coercive journal self citations, impact factor, journal influence and article influence.

Keywords: Modeling, simulation, forecasting, time series models, trading, credit risk, empirical finance, health economics, sampling, groundwater systems, exchange rates, structural change, citations.

JEL Classifications: C15, C63, E14, E27, E37, E47, F37, F47.

Acknowledgements: The authors are grateful to the numerous reviewers for their speedy and efficiency, and to Ellen Young and France Pinon for substantial assistance in the preparation of this volume. The first author is most grateful to the Australian Research Council, National Science Council, Taiwan, and the Japan Society for the Promotion of Science, and the second author wishes to acknowledge the Australian Research Council and the School of Economics and Finance at Curtin University.

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Modeling and Simulation: An Overview

1. Introduction.

The Modeling and Simulation Society of Australia and New Zealand (MSSANZ) held its Biennial Conference in conjunction with International Association for Mathematics and Computers in Simulation (IMACS) and other societies at the MSSANZ 19th Biennial Conference on Modeling and Simulation, Perth Convention Exhibition Centre, Perth, Western Australia, 12-16 December, 2011. The conference attracted 551 delegates from 35 countries.

This special issue of *Mathematics and Computers in Simulation* contains a selection of plenary, invited and contributed papers presented at the conference, illustrating the expertise and fields of research of expert modelers in Australia, New Zealand, and many other countries, with large contributions from researchers in Australia, New Zealand, Japan, China, Hong Kong, Taiwan and the Netherlands, in particular. Each paper was fully reviewed by two referees, and represents a substantially edited, revised and/or extended version of what was presented at the conference.

The promotion, development, assistance and dissemination of knowledge in all areas of modeling and simulation in Australia and New Zealand are the primary aims of MSSANZ. Affiliated with IMACS, the society includes members with diverse backgrounds in a wide range of areas of professional interest. It is this interaction among disciplines, and the resulting cross-fertilisation of techniques and ideas, which has traditionally been a prime objective of the society.

The latest Biennial Conference in Perth, proved no exception, as illustrated by the diversity and innovative content of the selected papers in this special issue on modeling and simulation arising from the conference.

In addition to five plenary and nine keynote addresses, five hundred and seventy-three other invited and contributed papers were presented in one of nine concurrent streams throughout five days of the conference. In keeping with the multi- and inter-disciplinary nature of the society, there was a multiplicity of contributed papers across a broad range of topics including; modeling data in health sciences, modeling of bushfire and associated processes, industrial modeling and simulations, solving practical inverse problems, modeling and simulation in

manufacturing, defence and homeland security applications of modeling and simulation, computational fluid dynamics, computational science using GPUs, computational methods and simulation in geoscience, spatio-temporal modeling in public health, contributed papers in applied and computational mathematics, agricultural systems, modeling infectious disease transmission and control, modern approaches in plant growth modeling, modeling of gene-environment interactions to analyze the susceptibility and progression of chronic human diseases, advances in neural networks and machine learning and applications in natural and environmental systems, geo-informatics, scientific workflow tools for the environmental domain - technologies and applications, integration of models with decision-support systems, behavioral economics, econometric modeling and financial econometrics, economic modeling, experimental economics, modeling and financial management, modeling and managing tourism demand, modeling international business and finance, consumer, marketing, tourism-hospitality research, combining information in socio-economic modeling and forecasting, applied risk modeling, sustaining China's future: understanding economic, social and environmental challenges, forecasting, commodity markets, advanced methods for modeling spatio-temporal aspects of air pollution effects on human health and ecosystems, GIS and environmental modeling, hydrologic applications of remote sensing, pesticide modeling from paddock to ocean, survey designs for ecological monitoring, top-down catchment model, multidisciplinary risk modeling in the management of ocean and coastal resources, models and mathematical techniques in evaluation of environmental sustainability, modeling and decision making in ecological systems, improvements in integrated catchment modeling techniques, terrain analysis and geomorphometry with high resolution terrain data, model and decision support for improved ecological outcomes, spatially explicit population modeling, agriculture sustainability in a changing climate, Earth surface modeling, phenological indicators of climate change: new modeling approaches, strategies, statistics, mathematics and policy, projections of climate change: from modeling to applications, statistical downscaling of climate: methods and applications for water and the environment, modeling natural hazards, assessing the contribution to knowledge by case study research using post normal science methods, characterisation and parameterisation of behavioural dimensions in empirical agent-based simulation, stakeholder evaluation of decision-support systems, models and other software tools, use and relevance of modeling for environmental impact assessments, modeling the social dimensions of climate change, decarbonising cities and regions, multi-model research collaborations, data management, computational simulation, modeling and visualisation of cities, simulation of terrorist incidents and all hazard events, innovations in water en-

gineering: the role of data-based techniques, integrated land surface modeling and data assimilation, regionalising hydrologic response to improve predictions of large-scale water availability, statistical methods in hydrology and water quality science, understanding and modeling climate-water relationships and dominant processes in a changing climate, coupled physical-ecological modeling for unravelling the effects of environmental change on aquatic systems, regional flood modeling in Australia for ARR revisions, managing uncertainty in the decision making process: with an optional focus on water systems, measuring and modeling the interaction between surface water and groundwater, advances in modeling and control of large-scale water resources systems, mathematical modeling theory, methodology and applications in ecohydrology, modeling of water quality in streams, estuaries, waterbodies and storages.

Papers in this special issue have been selected from a number of areas, namely: improving judgmental adjustment of model-based forecasts, whether forecast updates are progressive, on a constrained mixture vector autoregressive model, whether all estimators are born equal: the empirical properties of some estimators of long memory, characterising trader manipulation in a limit-order driven market, measuring bias in a term-structure model of commodity prices through the comparison of simultaneous and sequential estimation, modeling tail credit risk using transition matrices, evaluation of the DPC-based inclusive payment system in Japan for cataract operations by a new model, the matching of lead underwriters and issuing firms in the Japanese corporate bond market, stochastic life table forecasting: a time-simultaneous fan chart application, adaptive survey designs for sampling rare and clustered populations, income distribution inequality, globalization, and innovation: a general equilibrium simulation, whether exchange rates affect consumer prices: a comparative analysis for Australia, China and India, the impacts of exchange rates on Australia's domestic and outbound travel markets, clean development mechanism in China: regional distribution and prospects, design and implementation of a Web-based groundwater data management system, the impact of serial correlation on testing for structural change in binary choice model: Monte Carlo evidence, and coercive journal self citations, impact factor, journal influence and article influence.

The 20th Biennial Conference of the Society will be held in Adelaide, South Australia, 1-6 December 2013. The conference is sponsored by MSSANZ in conjunction with IMACS and other societies.

2. Overview.

This section provides an overview of the 18 papers on modeling and simulation that have been selected for the special issue.

“Improving judgmental adjustment of model-based forecasts” by Philip Hans Franses (Erasmus University Rotterdam) is the first paper [6]. Many managers have access to statistical model-based forecasts and can use these to create their own forecasts. To the analyst, who aims to evaluate forecast accuracy, it is usually unknown to what extent managers use those model forecasts. Moreover, in other situations the analyst may not even have access to those model-based forecasts. The survey reports on recent developments within this context which concern an understanding of the creation of such managers’ forecasts given that model forecasts are potentially incorporated and the evaluation of their accuracy. A variety of further research topics is given.

The second paper [4] is entitled “Are forecast updates progressive?” by Chia-Lin Chang (National Chung Hsing University), Philip Hans Franses (Erasmus University Rotterdam) and Michael McAleer Erasmus University Rotterdam). Many macroeconomic forecasts and forecast updates, such as those from the IMF and OECD, typically involve both a model component, which is replicable, as well as intuition, which is non-replicable. Intuition is expert knowledge possessed by a forecaster. If forecast updates are progressive, forecast updates should become more accurate, on average, as the actual value is approached. Otherwise, forecast updates would be neutral. The paper proposes a methodology to test whether macroeconomic forecast updates are progressive, where the interaction between model and intuition is explicitly taken into account. The data set for the empirical analysis is for Taiwan, where the authors have three decades of quarterly data available of forecasts and their updates of the inflation rate and real GDP growth rate. the empirical results suggest that the forecast updates for Taiwan are progressive, and that progress can be explained predominantly by improved intuition.

“On a constrained mixture vector autoregressive model” by Chun Shan Wong (Department of Finance, Chinese university of Hong Kong) is the third paper [17]. A mixture vector autoregressive model has recently been introduced to the literature. Although this model is a promising candidate for nonlinear multiple time series modeling, high dimensionality of the parameters and lack of method for computing the standard errors of estimates limit its application to real data. The contribution of the paper is threefold. First, a form of parameter constraints is introduced with an efficient EM algorithm for estimation. Second, an accurate

method for computing standard errors is presented for the model with and without parameter constraints. Third, a hypothesis testing approach based on likelihood ratio tests is proposed, which aids in the selection of unnecessary parameters and leads to the greater efficiency at the estimation. A case study using U.S. Treasury constant maturity rates illustrates the applicability of the mixture vector autoregressive model with parameter constraints, and the importance of using a reliable method to compute standard errors.

The fourth paper [13] is entitled "Not all estimators are born equal: The empirical properties of some estimators of long memory" by William Rea (University of Canterbury), Les Oxley (University of Waikato), Marco Reale (University of Canterbury) and Jennifer Brown (University of Canterbury). The authors present the results of a simulation study into the properties of 12 different estimators of the Hurst parameter, *H*, or the fractional integration parameter, *d*, in long memory time series which are available in R packages. They compare and contrast their performance on simulated Fractional Gaussian Noises and fractionally integrated series with lengths between 100 and 10,000 data points, and *H* values between 0.55 and 0.90, or *d* values between 0.05 and 0.40. The authors apply all 12 estimators to the Campito Mountain data and estimate the accuracy of their estimates using the Beran goodness-of-fit test for long memory time series.

"Characterising trader manipulation in a limit-order driven market" by Rasika Maduranga Withanawasam (University of Otago), Peter Whigham (University of Otago), and Timothy Crack (University of Otago) is the fifth paper [16]. Use of trading strategies to mislead other market participants, commonly termed trade-based market manipulation, has been identified as a major problem faced by present day stock markets. Although some mathematical models of trade-based market manipulation have been previously developed, the paper presents a framework for manipulation in the context of a realistic computational model of a limit-order market. The Maslov limit order market model is extended to introduce manipulators and technical traders. The authors show that "pump and dump" manipulation is not possible with traditional Maslov (liquidity) traders. The presence of technical traders, however, makes profitable manipulation possible. When exploiting the behaviour of technical traders, manipulators can wait some time after their buying phase before selling, in order to profit. Moreover, if technical traders believe that there is an information asymmetry between buy and sell actions, the manipulator effort required to perform a "pump and dump" is comparatively low, and a manipulator can generate profits even by selling immediately after raising the price.

The sixth paper [15] is entitled "Measuring bias in a term-structure model of commodity prices through the comparison of simultaneous and sequential estimation" by Hiroaki Suenaga (Curtin University). The paper examines bias in a term-structure model of commodity prices in specifying the true stochastic dynamics of underlying spot price. The bias is quantified by comparing the model estimated by the conventional method of estimating all model parameters simultaneously with a panel of futures prices and the model estimated by an alternative method of estimating model parameters in two steps. In this alternative approach, a subset of model parameters is first estimated on the first difference of observed futures prices so that these parameters are free from bias in specifying deterministic price variation and the dynamics of the underlying state variables. In the second step, the remaining model parameters are estimated on the futures price equations, while holding the parameters estimated in the first step. Empirical applications to four commodities (gold, crude oil, natural gas, and corn) reveal that the two-factor model widely considered in the literature is subject to a misspecification bias of substantial size. Out-of-sample forecast test indicates that, for three of the four commodities considered, the model estimated by the sequential method yields a considerably more accurate price forecast than the model estimated by the simultaneous method.

"Modeling tail credit risk using transition matrices" by David Allen (Edith Cowan University), Akhmad Kramadibrata (Edith Cowan Univerity), Robert Powell (Edith Cowan Univerity) and Abhay Singh (Edith Cowan Univerity) is the seventh paper [1]. Innovative transition matrix techniques are used to compare extreme credit risk for Australian and US companies, both prior to and during the Global Financial Crisis (GFC). Transition matrix methodology is traditionally used to measure Value at Risk (VaR), a measure of risk below a specified threshold. The authors use it to measure Conditional Value-at-Risk (CVaR), which is the risk beyond VaR. They find significant differences in VaR and CVaR measurements in both the US and Australian markets. They also find a greater differential between VaR and CVaR for the US as compared to Australia, reflecting the more extreme credit risk that was experienced in the US during the GFC. Traditional transition matrix methodology assumes that all borrowers of the same credit rating transition equally, whereas the paper incorporates an adjustment based on industry share price fluctuations to allow for unequal transition among industries. The revised model shows greater change between Pre-GFC and GFC total credit risk than the traditional model, meaning that those industries that were riskiest during the GFC are not the same industries that were riskiest Pre-GFC. Overall, the analysis finds that the pro-

posed innovative modeling techniques are better able to account for the impact of extreme risk circumstances and industry composition than traditional transition matrix techniques.

The eighth paper [12] is entitled “Evaluation of the DPC-based inclusive payment system in Japan for cataract operations by a new model” by Kazumitsu Nawata (University of Tokyo) and K. Kawabuchi (Tokyo Medical and Dental Univerity). The authors propose a new model for analyzing the length of hospital stay when variances are heterogeneous. The model is an alternative to conventional models such as Cox’s proportional hazard model, and can be used to address various problems of survival analysis. The model is a heteroskedastic version of the Box-Cox transformation model and is estimated by the Tobit maximum likelihood method, and its estimation can be easily done using a standard statistical package program. Using the proposed model, the authors analyze the effects of the diagnosis procedure combination/per diem payment system (DPC/PDPS) on the length of hospital stay following cataract operations in Japan. Data collected from six general hospitals before and after the introduction of the system are analyzed, with the number of patients being 2,677.

“The matching of lead underwriters and issuing firms in the Japanese corporate bond market” by Colin McKenzie (Keio University) and Sumiko Takaoka (Seikei University) is the ninth paper [11]. The paper examines the role of reputation in the matching of lead underwriters and issuing firms in the straight corporate bond market in Japan. While the existing literature already investigates how the issuing firm chooses its lead underwriter at the time of issue, the paper uses successive issues of straight corporate bonds to examine how the matching of lead underwriters and issuing firms hanges over time. Data on individual issues of straight corporate bonds publicly issued in Japan between 25 February 1994 and 31 December 2009 are used to estimate models which explain how issuing firms match with lead underwriters. The authors measure the reputations of underwriters and issuing firms using each underwriter’s percentile rank in the underwriting market and the issuer’s percentile rank in the issuing proceeds, respectively. They construct a data set of straight corporate bond issues, which includes many repeated issues. One of the contributions in the paper is to take account of these repeated issues by treating the data as a panel data set, and allowing for an issuer random effect in both probit and logit models of switching. This random effect is found to be significant. The estimation results show that issuing firms match with the same lead underwriter when the difference of the issuer’s reputation and the current reputation of the previous lead underwriter is small. Issuing firms with an AAA rating at the time of issue are less likely to match with the same lead underwriters. In addition to reputation effects, there is strong evid-

ence to suggest that issuing firms continue to stay matched with the same underwriter if the lead underwriter is a subsidiary of the issuing firm's main bank.

The tenth paper [10] is entitled "Stochastic life table forecasting: A time-simultaneous fan chart application" by Johnny S.H. Li (University of Waterloo), Andrew C.Y. Ng (Chinese University of Hong Kong) and Wai-Sum Chan (Chinese University of Hong Kong). Given a fitted stochastic mortality model, the authors express the uncertainty associated with future death rates in terms of confidence or prediction intervals. Recently, researchers have proposed using fan charts to display prediction intervals for future mortality rates. Existing mortality fan charts are based on isolated pointwise prediction intervals. By pointwise is meant that the interval reflects uncertainty in a quantity at a single point of time, but it does not account for any dynamic property of the time series. In this paper, the authors overcome this limitation by introducing the concept of time-simultaneous fan charts. Instead of pointwise intervals, a time-simultaneous fan chart is derived from a prediction band with a prescribed probability of covering the whole time trajectory. The authors present two numerical methods for producing time-simultaneous fan charts. These methods can be applied to common stochastic mortality models, including the generalized Cairns-Blake-Dowd model. Finally, the proposed method is illustrated with mortality data from the populations of Australia and New Zealand.

"Adaptive survey designs for sampling rare and clustered populations" by Jennifer Brown (University of Canterbury), Mohammad Salehi (Qatar Univerity), Mohammad Moradi (Razi University), Bardia Panahbehagh (Isfahan University of Technology) and David Smith (U.S. Geological Survey) is the eleventh paper [2]. Designing an efficient large-area survey is a challenge, especially in environmental science when many populations are rare and clustered. Adaptive and unequal probability sampling designs are appealing when populations are rare and clustered because survey effort can be targeted to sub-areas of high interest. For example, higher density sub-areas are usually of more interest than lower density areas. Adaptive and unequal probability sampling offer flexibility for designing a long term survey because they can accommodate changes in survey objectives, changes in underlying environmental habitat, and changes in species-habitat models. There are many different adaptive sampling designs including adaptive cluster sampling, two-phase stratified sampling, two-stage sequential sampling, and complete allocation stratified sampling. Sample efficiency of these designs can be very high compared with simple random sampling. Large gains in efficiency can be made when survey effort is targeted to the sub-areas of the study site where there are clusters of

individuals from the underlying population. These survey methods work by partitioning the study area in some way, into strata, or primary sample units, or in the case of adaptive cluster sampling, into networks. Survey effort is then adaptively allocated to the strata or primary unit where there is some indication of higher species counts. Having smaller, and more numerous, strata improves efficiency because it allows more effective targeting of the adaptive, second-phase survey effort.

The twelfth paper [7] is entitled "Income distribution inequality, globalization, and innovation: A general equilibrium simulation" by Toshitaka Fukiharu (Aoyamagakuin University). Using a simulation approach, the paper examines if the income distribution inequality of a country expands through globalization and/or innovation, modifying the traditional Heckscher-Ohlin model. First, independently of innovation, globalization is examined for a country A with two industries (commodities) and four consumers: (aggregate) worker, (aggregate) capitalist, and two entrepreneurs. It is shown that there is a clear tendency for the inequality to expand by globalization. Furthermore, when country A is small, the inequality-promoting tendency is stronger. Second, the innovation is examined independently of globalization, by the procedure in which the new-third industry (commodity) and the new-third entrepreneur are introduced, so that there are five consumers. When innovation emerges in country A in autarky, it is shown that the innovation has tendency to cause inequality expansion. Finally, the innovation and globalization are examined in an integrated manner. The author starts with the country in the second case. It is shown that when the new-third commodity is produced only in country A and is a non-traded commodity, inequality tends to expand through globalization. It is also shown that when the third commodity is produced in both countries and is a traded commodity, there is a stronger tendency. Thus, there is a clear tendency for the inequality to expand through globalization and/or innovation.

"Do exchange rates affect consumer prices? A comparative analysis for Australia, China and India" by Shrabani Saha (Edith Cowan University) and Zhaoyong Zhang (Edith Cowan University) is the thirteenth paper [14]. An important issue for exchange rate pass-through (ERPT) is the extent to which exchange rate changes affect the prices of imported goods and the consumer prices. The objectives of the paper are to make a comparative study by exploring the literature relating pass-through for import prices and domestic prices in Australia, China and India. In particular, the authors test whether the exchange rate pass-through to import prices is complete, estimate the pass-through to consumer price index (CPI) to investigate whether there is any association between the pass-through and the average inflation rate

across these countries. A structural VAR model is used to examine the exchange rate pass-through over the period 1990-2011. The impulse responses indicate that exchange rates have less effect in the rising domestic prices in China and India. This will have important policy implication for monetary authorities.

The fourteenth paper [18] is entitled "The impacts of exchange rates on Australia's domestic and outbound travel markets" by Ghialy Choy Lee Yap (Edith Cowan University). In Australia, domestic tourism generated AUD 71 billion in 2010-11, representing approximately 75.2% of national tourism revenue. While the number of domestic overnight visitors increased by 2.34% in that year, the number of Australians travelling overseas grew by 7.45%. In fact, the dramatic appreciation of the Australian dollar against major currencies has motivated more Australians to travel overseas rather than domestically. The purpose of the paper is to examine the economic factors that influence the demand for Australian domestic and outbound tourism. In particular, the paper explores the extent to which the appreciation of the Australian dollar has affected the Australian domestic tourism industry. Using panel generalized least squares models, the empirical findings show that exchange rates influence Australians' decisions to travel.

"Clean development mechanism in China: Regional distribution and prospects" by Jin Hong (University of Science and Technology of China), Xiumei Guo (Curtin University), Dora Marinova (Curtin University), Fengli Yang (University of Science and Technology of China), and Wentao Yu (University of Science and Technology of China), is the fifteenth paper [8]. At the end of the first commitment period of the Kyoto Protocol, the purpose of this paper is to analyse the role the clean development mechanism (CDM) has played in reducing the global greenhouse gas (GHG) emissions and particularly, the place of China in promoting a low-carbon development. The findings outline the prominent role of China as a host for CDM projects and stress the importance of an institutional and regulatory environment that encourages technology transfer from developed to developing countries. A further contribution the paper makes is in outlining policy directions for the global CDM market and China in the post-Kyoto era.

The sixteenth paper [9] is entitled "Design and implementation of a Web-based groundwater data management system" by Takuya Iwanaga (Australian National University), Sondoss El Sawah (Australian National University) and Anthony Jakeman (Australian National University). Understanding and managing groundwater resources requires the integration of large amounts of high quality data from different sources. With the recent advances in GIS,

data storage, web-based applications, and visualization technologies, groundwater data management has entered a new phase. Currently in Australia (like many other countries), hydrological and groundwater data are collected and managed by many agencies, scattered in various formats and locations, and cannot be easily accessed by the public. The paper elaborates on the overall process of developing a web-based groundwater data management system in support of a unified framework for groundwater data collection and management. This unified framework is to facilitate access to the dispersed collections of data. The goal of the data management system under development is to provide a platform for collecting, storing, and sharing monitoring data within a larger network of data providers and end users (for example, researchers, field site managers, public). The authors describe the system architecture, the open source tools, and technologies used for implementation. The proposed system is flexible, accommodating different data types and sources, and can be expanded to include new field sites. Experience throughout the project demonstrates that ongoing communication among developers, field managers, and researchers, is essential to help resolve some of the technical/implementation problems and linguistic ambiguities that may arise throughout the data collection and automation process.

The penultimate paper [3] is entitled "The impact of serial correlation on testing for structural change in binary choice model: Monte Carlo evidence" by Felix Chan (Curtin University), Laurent Pauwels (University of Sydney) and Johnathan Wongsosaputro (Univerity of Sydney). The paper examines the finite sample properties of structural change tests with an unknown breakpoint for the probit model in the presence of serial correlation. The combination of structural change and serial correlation renders model estimation challenging, affecting the consistency of coefficient estimates. Although there is vast literature concerning structural change tests for linear time series models, the literature for such tests in the context of binary choice models is somewhat sparse. More importantly, the empirical literature has applied the standard tests of structural change on the discrete choice model, despite the fact that most of these tests were developed specifically for the linear regression model. Subsequently, the theoretical properties of these tests in the context of non-linear models are unknown. This includes the class of discrete choice models, such as probit and logit. The issue becomes even more complicated in the presence of serial correlation, since typical tests for structural change often require the assumption of independence in the error terms. Even when the tests allow for a weakly dependent structure in the data, their finite sample performance remains unknown. The paper conducts simulation analysis on the size of 'supremum' Wald, LR and LM

tests for structural change in the context of the probit model with varying levels of serial correlation. It is found that the shortcomings of the tests in linear models are magnified in probit models. In particular, the tests exhibit greater size distortion for the probit model than the linear model with the same level of serial correlation. Bootstrapping is also considered as an alternative approach to obtaining critical values, and though it reduces the size distortion in finite samples, it is unable to accommodate the distortion associated with a high level of serial correlation.

The final paper [5] is entitled "Coercive journal self citations, impact factor, journal influence and article influence" by Chia-Lin Chang (National Chung Hsing University), Michael McAleer (Erasmus University Rotterdam) and Les Oxley (University of Waikato). The paper examines the issue of coercive journal self citations and the practical usefulness of two recent journal performance metrics, namely the Eigenfactor score, which may be interpreted as measuring "Journal Influence", and the Article Influence score, using the Thomson Reuters ISI Web of Science (hereafter ISI) data for 2009 for the 200 most highly cited journals in each of the Sciences and Social Sciences. The paper also compares the two new bibliometric measures with two existing ISI metrics, namely Total Citations and the 5-year Impact Factor (5YIF) (including journal self citations) of a journal. It is shown that the Sciences and Social Sciences are different in terms of the strength of the relationship of journal performance metrics, although the actual relationships are very similar. Moreover, the journal influence and article influence journal performance metrics are shown to be closely related empirically to the two existing ISI metrics, and hence add little in practical usefulness to what is already known, except for eliminating the pressure arising from coercive journal self citations. These empirical results are compared with existing results in the bibliometrics literature.

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