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Editor's Forward for the Granger Special Volume

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Selected Quations:

> *"A teacher told my mother that 'I would never become successful', which illustrates the difficulty of long-run forecasting on inadequate data."*
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> "*I am not sure that I ever did become an economist. I started as a statistician and have ended as a time series econometrician. I have picked up some economics on the way and the field of econometrics has itself evolved to be closer to my interests as I have moved closer to the core of econometrics. Thus there are two components to my intellectual journey, from being a statistician to being something of an economist, and within econometrics, from being purely a time series econometrician to having greater appreciation for other components of the field of econometrics."*
> Clive Granger February 2005 lecture at Trinity University

It is an honor to be asked to edit the Special Volume of the *"Granger Econometrics and Statistical Modeling"* issue for the **European Journal of Pure and Applied Mathematics** (**EJPAM**) (www.ejpam.com) as one of the Advisory Editors of **EJPAM**. The idea of publishing a Special Volume was born from proactive thinking of Professor Eyüp Çetin, Editor-in-Chief of **EJPAM**. At first, I was hesitant to accept such an offer. My decision was based on the fact that I never met Professor Clive Granger and did not have any association with him. However, I knew his wonderful work and outstanding contributions for his work on the concept of co-integration –ways of analysing sequences of economic data recorded at regular intervals, known as time series; and on the concept of causality in economics, now known as Granger causality. After the insistence of Professor Çetin, and being a information-theoretic statistician and model selector of Akaike School, it was appropriate for me to take upon this challenging task in my heavy schedule and other responsibilities. So, I could not refuse.

Professor Sir Clive Granger died on May 27, 2009 at the age of 74, was a Nobel prize-winning statistician, economist, and innovative econometrician. To commorate the first anniversary of his passing and his outstanding contributions who was also one of the

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distinguished Advisory Editors of **EJPAM**, **EJPAM** decided to dedicate this special issue to honor Professor Sir Clive W. J. Granger.

We have solicited both contributed and invited papers and/or letter of condolences, memories, thoughts, and stories of how Professor Granger impacted the world around him from eminant econometricians, statisticians, and other scholars familiar with Professor Granger's work to dedicate this special issue in memory of him.

This Special Volume contains a collection of selected and edited papers I am grateful and extend my sincere thanks to all the contributors to this volume. All the submitted papers were reviewed and put in the format of **EJPAM** style. As the editor, I am ultimately responsible for any inadvertent errors or omissions.

The organization and the summary of each of the papers in **EJPAM** are as follows.

1. A Modern Approach to Teaching Econometrics by David F. Hendry and Bent Nielsen, Economics Department, Oxford University, U.K.

This paper presents a computer-based approach to the teaching of econometrics used in Oxford from the elementary to the advanced courses. Computer-based teaching of econometrics enhances the students' skills, so they can progress from binary events in a Bernoulli model with independent draws to model selection in non-stationary data in a year-long course which closely integrates theory and empirical modeling. The aims are to enable students to critically evaluate published applied studies and to undertake empirical research in economics. The unified theoretical framework is that of likelihood, using likelihood-ratio tests for inference and evaluation, and focusing on developing well-specified empirical models of interesting economic issues. A sequence of increasingly realistic models is developed from independent, identically distributed binary data through to selecting cointegrated equations in the face of structural breaks–in a one-year course. They can learn to build sensible empirical models of non-stationary data, aided by automatic modeling.

2. Bootstrapping the Shrinkage Least Absolute Deviations Estimator by Tae-Hwan Kim and Halbert White, School of Economics, Yonsei University, Seoul, Korea and the Department of Economics, University of California, San Diego, La Jolla, CA, U.S.A.

This paper studies the asymptotic moments of the "Optimal Weighting Scheme" (OWS) estimator by shrinking it to a data-dependent point. This permits the researcher to use a consistent estimator for the asymptotic moments to construct pivotal non-parametric bootstrap statistics. Paper further demonstrates their use by showing how to calculate bootstrap standard errors and confidence intervals for the OWS estimator.

3. Predictive Subset VAR Modeling Using the Genetic Algorithm and Information Complexity by J. Andrew Howe and Hamparsum Bozdogan, Department of Statistics, Operations and Management Science, The University of Tennessee, Knoxville, TN, U.S.A.

This paper introduces a novel predictive subset vector autoregressive (VAR) modeling approach using the genetic algorithm (GA), along with the appropriate form of information-theoretic measure of complexity (ICOMP) criterion as the fitness function to make accurate and efficient forecasts. Results are shown on the Standard and Poor S&P

500 index from a universe of the first five lags of six major market indices. In the testing period when the target index lost more than 15%, the identified subset VAR model gained over 17%. The prediction error bands built around the forecasts are half as wide as those obtained by the saturated model. The paper suggests that, when modeling complex vector autoregressions, a strict criterion that is robust to model misspecification is required even when there is no sign of heteroskedasticity, non-Gaussianity, or autocorrelation in the model residuals.

4. K-th Moving, Weighted and Exponential Moving Average for Time Series Forecasting Models by Chris P. Tsokos, Department of Mathematics and Statistics, University of South Florida, Tampa, FL, U.S.A.

This paper investigates the effectiveness of developing a forecasting model of a given nonstationary economic realization using a k-th moving average, a k-th weighted moving average and a k-th exponential weighted moving average process. A new nonstationary time series is created from the original realization using the three different weighted methods. Using real economic data the best ARIMA model is formulated and short term forecasting results are compared using the three proposed models with that of the classical ARIMA model.

5. Law of Iterated Logarithm and Strong Consistency in Poisson Regression Model Selection by Guogi Qian, Department of Mathematics and Statistics, University of Melbourne, Australia

This paper first derives a law of iterated logarithm for the maximum likelihood estimator of the parameters in a Poisson regression model. Then this result is useduse to establish the strong consistency of a class of model selection criteria in Poisson regression model selection. Paper further shows that under some general conditions, a model selection criterion, which consists of a minus maximum log-likelihood and a penalty term, will select the simplest correct model almost surely if the penalty term increases with model dimension and has an order in between O(log log n) and O(n).

6. A Generalization of Durbin-Watson Statistic by A. K. Gupta, D. G. Kabe, and S. NiwitPong, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, U.S.A., Mississauga, Ontario, Canada, and Department of Applied Statistics, King Mongkut's University of Technology North Bangkok, Thailand

This paper gives two generalizations of the Durbin-Watson Statistic d, for testing the serial correlation in a given univariate normal regression model. It is shown that the serial correlation is zero, to its multivariate counter part. In the univariate case the moments of d are obtained in terms of generalized gamma functions. The proposed methodology is based on the generalized quadratic form of the central Wishart distribution.

7. Stylized Facts of Financial Time Series and Three Popular Models of Volatility by Hans Malmsten and Timo Teräsvirta Länsförsäkringar, Stockholm and CREATES, Aarhus University, Aarhus, Denmark

This paper considers the properties of three well-known and frequently applied first-order models for modelling and forecasting volatility in daily or weekly financial series

such as stock and exchange rate returns. The standard Generalized Autoregressive Conditional Heteroskedasticity (GARCH), the Exponential GARCH and the Autoregressive Stochastic Volatility models are studied. The focus in this paper is on finding out how well these models are able to reproduce characteristic features of such series, also called stylized facts. These include high kurtosis and a rather low-starting and slowly decaying autocorrelation function of the squared or absolute-valued observations. The autocorrelations of absolute-valued returns raised to a positive power are maximized when this power equals unity. Based on results on the moment structure of these models, it has been shown that none of the models dominates the others when it comes to reproducing stylized facts in typical financial time series.

8. Diffusion Index Models and Index Proxies: Recent Results and New Directions by Nii Ayi Armah and Norman R. Swanson, The Bank of Canada, Ottawa, Canada, and Department of Economics, Rutgers University, New Brunswick, NJ, U.S.A.

This paper presents diffusion index models which have received considerable attention from both theoreticians and empirical econometricians in recent years. One reason for this is that datasets with many variables are increasingly becoming available and being utilized for economic modelling, and another is that common factors are often assumed to underlie the co-movements of a set of macroeconomic variables. The paper reviews some recent results in the study of diffusion index models, focusing primarily on new advances in this area. The construction of factors used in prediction models implemented using diffusion index methodology and approaches that are useful for assessing whether there are observable variables that adequately "proxy" for estimated factors are shown and illustrated.

9. Variance-ratio Tests Robust to a Break in Drift by Yunmi Kim and Tae-Hwan Kim, Department of Economics, University of Manitoba, Canada, and School of Economics, Yonsei University, Seoul, Korea

This paper considers a simple random walk process which exhibits a deterministic break in its drift term: for instance, from positive to negative. The paper demonstrates both theoretically and by simulation that when the standard variance ratio test is applied to this process, the phenomenon of spurious rejections of the random walk hypothesis can occur. A modified version of the variance ratio test to avoid such a problem is proposed and some implications of this finding on the previously revealed empirical evidence against the random walk hypothesis for exchange rates is discussed.

10. A Generalization of the Concept of Cointegration to Harmonizable and Class (KF) Processes by Roselyne Joyeux Faculty of Business and Economics, Macquarie University, Sydney, Australia

This paper considers the generalization of the concept of cointegration to nonstationary processes which are not necessarily I(d). It shows that the class of non-stationary processes considered belong to the Kampé de Fériet (KF) class. Later, this paper generalizes the concept of cointegration to class (KF) processes. This paper considers the situation where non-stationary processes generated by nonlinear systems which co-move according to a linear adjustment process. The paper further considers the case where one might

have two I(1) processes co-moving according to a nonlinear or heteroskedastic adjustment process.

11. A New Skew-normal Model for the Application-Oriented Skew-t Model by John T. Chen, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, Ohio, U.S.A.

This paper discusses a general method of formulation for statistical analysis of data with excess kurtosis and asymmetry. The new way of modeling skewness is application oriented. It stems from the application in analyzing bivariate time series for economics data. This paper presents a new skew-normal ditsribution for the application-oriented skew-t model to analyze common factors in conditional distributions for bivariate time series. Different from many existing versions of theory-oriented skew-t models, the skew-t model that Professor Granger and his collaborators used was directly motivated by applications in analyzing economics data. This application-oriented skew-t model has discernible features on enabling model flexibility and keeping the practical standardizing conditions.

12. Likelihood Ratio Tests on Cointegrating Vectors, Disequilibrium Adjustment Vectors, and Their Orthogonal Complements by Norman Morin, Division of Research and Statistics, Federal Reserve Board, Washington, DC, U.S.A.

This paper develops three new hypothesis tests for combining structural hypotheses on cointegrating relationships and on their disequilibrium adjustment vectors in Johansen's multivariate maximum likelihood cointegration framework. It presents three likelihood ratio (LR) tests for simultaneously testing restrictions on cointegrating relationships and on how quickly each variable in the system reacts to the deviation from equilibrium implied by the cointegrating relationships. Both the orthogonal complements of the cointegrating vectors and of the vectors of adjustment speeds have been used to define the common stochastic trends of a nonstationary system. These tests possess closed-form solutions for parameter estimates under the null hypothesis. Thus, one may combine tests for restrictions on the long-run relationships represented by cointegrating relationships, the adjustments to them, and the common stochastic trends of a system of variables.

13. Approximating Expectation Functionals for Financial Optimization by Chanaka Edirisinghe, Department of Statistics, Operations and Management Science, College of Business, University of Tennessee, Knoxville, TN 37996, U.S.A.

This paper focuses on risk control in portfolio of investments using expected risk functionals embedded in a decision optimization model. Incorporating asymmetric risk functions allows the investor to mitigate the effects of errors in econometric modeling of financial time series, as well as representing attitudes toward risk. However, such risk functions often require computing multidimensional expectations that are numerically intractable. This paper presents an approach for computing approximations on expectation using generalized moment problems under mean and covariance information of the random asset return vectors. These approximations are applied within a portfolio model consisting of Standard and Poors 100 stocks. Using a target deficit-based risk function and historical 10-year return data, the approximation-based future scenarios of stock returns yield outstanding out-of-sample performance for the portfolio. In contrast, assuming normally dis-

tributed returns and using the standard mean-variance portfolio tradeoff lead to inferior portfolios in the (out-of-sample) first half of 2010.

I would like to acknowledge the letter of condolences, memories, thoughts from Professor David J. Hand, President, Royal Statistical Society Imperial College, London, U. K.; from Professor Katsuto Tanaka, Hitotsubashi University, Tokyo, Japan, on behalf of the Japan Statistical Society; from Professor Nilss Olekalns, Head of the Department of Economics, University of Melbourne, Australia; from Professors Robin Harrison, Les Oxley, Department of Economics and Finance, Erskine Programme Manager Michelle Blackmore, all at the University of Canterburry, Christchurch, New Zealand; Professor Halbert White, Department of Economics, University of California, San Diego; Professor Harald Uhlig, Chair of the Department of Economics, the University of Chicago; from Professor Roselyne Joyeux of the Department of Economics, Macquarie University, Sydney, Australia; and Professor Eyüp Çetin, Editor-in-Chief of **EJPAM**.

We gratefully acknowledge the source of the autobiography of Professor Clive Granger http://nobelprize.org/nobel_prizes/economics/laureates/2003/granger-autobio.html

I would like to acknowledge with my sincere thanks the countless hours and help I received from Dr. J. Andrew Howe, my former Ph.D. student in putting all these papers in latex style format of **EJPAM**. Also, I would like to acknowledge the continual help of the Editorial Group: Professor Ünsal Tekir, Barış Kiremitci, and last but least Professor Eyüp Çetin, Editor-in-Chief of **EJPAM** in making this Special Volume a reality.

In dedicating this volume to the outstanding contributions of Professor Clive Granger on time-series econometrics, it is my hope that the readers will find the published papers interesting and helpful covering diverse areas.

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