EAST ASIA TRAINING & CONSULTANCY PTE Ltd

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Macroeconometric & Financial Modeling with GAUSS

3-Day Professional Development Workshop in Singapore

East Asia Training & Consultancy Pte Ltd invites you to attend a three-day professional development workshop in Singapore, with a focus of understanding the econometric and financial procedures underlying various models by developing computer programs using the GAUSS software. GAUSS is the well- known Mathematical and Statistical Program developed by Aptech System (USA).

Course Programme

This is a 3-day intensive course at the advanced level on modeling macroeconomic and financial variables that use the econometric software GAUSS. The topics of the workshop include: Estimation of Continuous Time Models in Finance (Day 1); Unit Root Testing (Day 2); and Modeling Non-stationary Time Series (Day 3). This advanced workshop gives a thorough overview of contemporary techniques used in quantitative financial analysis, with the emphasis on recent advances in nonstationary stochastic modeling of asset prices and returns series. The workshop will use the GAUSS software. Although the workshop emphases the theory underlying the each topic, there is also emphasis given to understanding and interpreting the results of estimated models. The approach is "hands on" with the instructor discussing relevant concepts and then illustrating in GAUSS with participants replicating each step at their own PCs. The workshop will take place in a computer-linked environment.

Morning sessions will be devoted to interactive lectures and summing-up discussions. Afternoon sessions will mainly be computer-based: participants will be working on real-life data of world-wide stock market prices and will also create (simulate) their own datasets. Participants will be taught basics GAUSS: modern computer software especially suitable for tackling non-trivial problems in nonlinear financial modelling.

Course Goal

After completion of the workshop you will know the basic mathematical apparatus of the diffusion analysis of financial time series, will acquire knowledge of the up-to-date tests for structural breaks and nonstationarity. Moreover, you will also be taught the

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newest techniques used for the analysis of nonlinear nonstationary financial time series and how to deal with market inefficiency and speculative processes.

By the end of the workshop, participants will have acquired detailed knowledge of and **extensive hands-on experience** in:

- the use of GAUSS,
- Monte Carlo analysis in finance,
- Monte Carlo analysis of Brownian motion and Ito processes,
- Non-Black-Scholes options price model estimations,
- modeling nonstationary financial series,
- co-breaking and forecasting of nonstationary financial series,
- contemporary unit root tests and procedures,
- simulation and empirical analysis of speculative stock market bubble processes,
- formulating scenarios and running simulations,
- reporting and interpreting the results.

Assumed Background

Whilst it is not assumed that participants are familiar with this software, it is assumed that the participants have some basic programming skills including the knowledge of DO loops and IF statements. Participants are also expected to be familiar with basic econometric procedures including regression analysis, nonstationarity and maximum likelihood estimation as well as have some basic knowledge of matrix algebra.

Who Should Attend

The course is aimed at Econometricians, Financial Analysts, Economic Researchers, Model Builders, Financial Modelers, Arbitrage Traders, Quantitative Investment Analysts, Portfolio Strategists, Interest Rate & Currency Analysts, Treasury Strategists, University Instructors, Statisticians, and Policy Planners & Researchers.

Fees & Registration

The fee for this 3-day comprehensive GAUSS workshop includes course materials, lectures, lunches, and the opportunity to network with Gauss users across the different industries in the Asia Pacific region. Participants are required to bring their own laptops.

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The number of participants is restricted. Please register early to guarantee your place. Please complete the official registration form and email it to us at GAUSS@eastasiatc.com.sg to reserve your place. Further instructions will be sent to confirmed participants.

Financial Assistance

Participants may be eligible for Financial Sector Development Fund (FSDF) support on a case by case basis. Interested applicants should submit their applications to the FSDF Secretariat directly. More details on the FSDF can be found at "http://www.mas.gov.sg."

Course Outline (subject to minor changes)

On each day, the course is divided into both theory and computer classes whereby the computer classes allow the participants of the workshop to work through a number of questions with a range of data sets. A full set of lecture notes and exercises are available as well as GAUSS command and data files.

DAY 1 (Full Day)

Estimation of Continuous Time Models in Finance

• **Topics:** Monte Carlo analysis of Brownian motion and Ito processes, recent advances in simulation estimation methods of continuous time models, Estimating non-Black-Scholes option price models based on nonnormal distributions and time-varying volatility.

• **Description:** The computer language GAUSS is used to estimate a range of models in finance with emphasis on continuous time models. Both maximum likelihood, and recent advances based on efficient method of moments and indirect inference estimators are used. An important feature of the latter estimator is the simulation of continuous time processes using Monte Carlo methods.

• **Case Studies:** Continuous time models of interest rates, Cox- Ingersoll-Ross multifactor models of interest rates, Pricing equity options and currency options under general volatility structures and nonnormality.

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DAY 2 (Full Day)

Unit Root Testing

• **Topics**: Univariate unit root tests, Unit root tests with structural breaks, recent advances in panel unit root tests.

• **Description:** Existing univariate tests based on the augmented Dickey-Fuller test, the Phillips-Perron test and more recent advances including the Kwiatkowski-Phillips-Schmidt-Shin test and the Elliot-Rothenberg-Stock point optimal test, are reviewed. Two recent extensions in unit root testing are then explored. The first being unit roots tests in the presence of structural breaks and
the second being the application of unit root tests to panel data. Simulating critical values of tests to work out both size and power properties are also discussed and demonstrated using GAUSS.

• **Case Studies:** Testing for stock market bubbles, testing structural breaks in interest rates, testing for purchasing power parity in panel data sets.

DAY 3 (Full Day)

Modeling Non-stationary Time Series

• **Topics**: VARs, ECMs, Cointegration, Co-breaking structural breaks, Forecasting, Stochastic simulation and scenario analysis in macroeconomics and finance.

• **Description**: Cointegration and error correction modeling techniques are developed and applied using the Johansen maximum likelihood estimator. Testing procedures based on likelihood ratio tests, Wald and Lagrange multiplier tests are also discussed in the context of testing the number of cointegrating vectors, weak exogeneity tests and Granger causality. The framework is extended to allow for trends and recent advances in co-breaking structural break models. The properties of the models are discussed in terms of forecastability and stochastic simulations to perform scenario analyses. Reporting and interpreting results are also discussed in the context of a range of case studies. All estimation and testing procedures are fully demonstrated using GAUSS.

• **Case Studies**: The development of a macroeconometric model of Singapore, Permanent income hypothesis, Multivariate models of interest rates.