Preface

A major research area of Ching-Zong Wei (1949–2004) was time series models and their applications in econometrics and engineering, to which he made many important contributions. A conference on time series and related topics in memory of him was held on December 12–14, 2005, at Academia Sinica in Taipei, where he was Director of the Institute of Statistical Science from 1993 to 1999. Of the forty-two speakers at the conference, twenty contributed to this volume. These papers are listed under the following three headings.

1. Estimation and prediction in time series models

Breidt, Davis, Hsu and Rosenblatt consider estimation of the unknown moving average parameter θ in an MA(1) model when $\theta = 1$, and derive the limiting pile-up probabilities $P(\hat{\theta} = 1)$ and $1/n$-asymptotics for the Laplace likelihood estimator $\hat{\theta}$. Cantor and Findley introduce a recursive estimator for θ in a possibly misspecified MA(1) model and obtain convergence results by approximating the recursive algorithm for the estimator by a Robbins–Monro-type stochastic approximation scheme. Giurcăneanu and Rissanen consider estimation of the order of AR and ARMA models by stochastic complexity, which is the negative logarithm of a normalized maximum likelihood universal density function. Nielsen investigates estimation of the order in general vector autoregressive models and shows that likelihood-based information criteria, and likelihood ratio tests and residual-based tests can be used, regardless of whether the characteristic roots are inside, or on, or outside the unit disk, and also in the presence of deterministic terms. Instead of model selection, Pötscher considers model averaging in linear regression models, and derives the finite-sample and asymptotic distributions of model averaging estimators. Robinson derives the asymptotic properties of conditional-sum-of squares estimates in parametric models of stationary time series with long memory. Ing and Sin consider the final prediction error and the accumulated prediction error of the adaptive least squares predictor in stochastic regression models with nonstationary regressors. The paper by Lin and Wei, which was in preparation when Ching-Zong was still healthy, investigates the adaptive least squares predictor in unit-root nonstationary processes.

2. Time series modeling in finance, macroeconomics and other applications

Aston considers criteria for deciding when and where heavy-tailed models should be used for macroeconomic time series, especially those in which outliers are present. Hsiao reviews nonstationary time series analysis from the perspective of the Cowles Commission structural equation approach, and shows that the same rank condition for identification holds for both stationary and nonstationary time series, that certain instrumental variables are needed for consistent parameter estimation, and that classical instrumental-variable estimators have to be modified for valid inference in the presence of unit roots. Chan and Ng investigate option pricing when

the volatility of the underlying asset follows a fractional version of the CEV (constant elasticity of variance) model. Ho considers linear process models, with a latent long-memory volatility component, for asset returns and provides asymptotically normal estimates, with a slower convergence rate than $1/\sqrt{n}$, of the Sharpe ratios in these investment models. Tsay reviews some commonly used models for the time-varying multivariate volatility of k (≥ 2) assets and proposes a simple parsimonious approach that satisfies positive definite constraints on the time-varying correlation matrix. Lai and Wong propose a new approach to time series modeling that combines subject-matter knowledge of the system dynamics with statistical techniques in time series analysis and regression, and apply this approach to American option pricing and the Canadian lynx data.

3. Related topics

Besides time series analysis, Ching-Zong also made important contributions to the multi-armed bandit problem, estimation in branching processes with immigration, stochastic approximation, adaptive control and limit theorems in probability, and had an active interest in the closely related areas of experimental design, stochastic control and estimation in non-regular and non-ergodic models. The paper by Chan, Fu and Hu uses the multi-armed bandit problem with precedence relations to analyze a multi-phase management problem and thereby establishes the asymptotic optimality of certain strategies. Yao develops an approximation to Gittins index in the discounted multi-armed bandit problem by using a continuity correction in an associated optional stopping problem. Chen and Xia describe Stein's method for Poisson approximation and for Poisson process approximation from the points of view of immigration-death processes and Palm distributions. Cheng, Wu and Huwang propose a new approach, which is based on a response surface model, to the analysis of experiments that use the technique of sliding levels to treat related factors, and demonstrate the superiority of this approach over previous methods in the literature. Chiang, Sheu and Shiu formulate the valuation problem of a financial derivative in markets with transaction costs as a stochastic control problem and consider optimization of expected utility by using the price systems for these markets. Wong and Li propose to use the maximum product of spacings (MPS) method for parameter estimation in the GEV (generalized extreme value) family and the generalized Pareto family of distributions, and show that the MPS estimates are asymptotically efficient and can outperform the maximum likelihood estimates.

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