


**Editors' introduction:
Asymmetries and nonlinearities in dynamic
economic models** 

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This Annals issue of the Journal of Econometrics contains seven contributions to the field of asymmetries and nonlinearities in economic dynamics.

Richard Baillie, Tim Bollerslev, and Hans Ole Mikkelsen inspect the empirical evidence that measures of volatility taken from high-frequency data exhibit long-memory properties and propose to extend the class of ARCH models to processes with fractional integration of conditional variances. The FIGARCH process implies a slow hyperbolic rate of decay for the influence of lagged squared innovations, so that the effect of a volatility shock is quite persistent but eventually mean-reverting. The quasi maximum likelihood estimates (QMLE's) of the process' parameters are conjectured to be \sqrt{T} -consistent, with a limiting normal distribution that provides very good finite-sample approximations for high frequencies. Monte Carlo simulations confirm this and an empirical example with daily Deutschmark–U.S. dollar exchange rates indicates rejection of the stable GARCH and IGARCH null hypotheses in favor of the FIGARCH process.

Feike Drost and Bas Werker's paper brings together the continuous time models that play a central role in modern finance theory and the discrete time GARCH processes that are often used to describe the observed dynamics of financial data. Simple criteria are derived to discriminate between groups of continuous time GARCH models that are smooth or contain jumps. These are then used to distinguish between GARCH diffusion and jump-diffusion processes at arbitrary frequencies. Parameterization of the kurtosis of the corresponding discrete time GARCH processes permits estimation of continuous time GARCH processes for the available frequencies of the data.

Øyvind Eitrheim and Timo Teräsvirta propose Lagrange multiplier tests for residual autocorrelation, residual nonlinearity, and parameter constancy for the

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class of smooth transition autoregressive models. Small-sample properties of the F version of the tests are also investigated. The tests developed in this paper are useful additions to the toolkit that is available for researchers that are interested in building nonlinear smooth transition regression models. The tests can also be applied in the context of threshold autoregressive and switching regression models when the switching variable is observable.

Victor Fenton and Ron Gallant assess the qualitative behaviour of semi-nonparametric (SNP) density estimation for univariate high-frequency time series data in finite samples. The paper discusses two types of consistency results, one based on the Sobolev norm and one based on the L1 norm. Computational problems are discussed and various Monte Carlo results are presented, showing that the SNP estimator competes well with the kernel estimator.

Gary Koop, Hashem Pesaran, and Simon Potter present a unified approach to impulse response analysis, capable of dealing with both linear and nonlinear multivariate models. The unifying concept is the generalised impulse response function. They use this to develop among other things, measures of shock persistence and asymmetric effects. An example is provided based on a bivariate model of U.S. GNP and unemployment.

Gerard Pfann, Peter Schotman, and Rolf Tschernig investigate the nonlinear dynamics present in the time-series data on the U.S. three-month Treasury Bill rate using a mean-reverting autoregressive endogenous threshold model. The model implies a nonlinear term structure that is confronted with data on ten-year U.S. government bonds. The model's properties of endogenous switching and mean-reversion capture the empirical fact that at high levels of the interest rates long rates are less volatile than short rates.

George Tauchen, Harold Zhang, and Ming Liu apply nonlinear impulse response analysis to investigate the interrelationships among stock price volatility, trading volume, and leverage effects of four stocks actively traded on the New York Stock Exchange. The leverage effects of price shocks on volatility are asymmetric but small (two or three days) relative to the direct effects that can last for several weeks, and trading volumes respond in a nonlinear way to price shocks. The novel finding is that each stock price series shows persistent but mean-reverting response of volatility to large shocks. This is consistent with the results reported in the Baillie–Bollerslev–Mikkelsen paper, also published in this issue.

The seven papers published in this issue have been selected from the contributions to an international conference held at the Universidad Carlos III de Madrid in Spain on the 13th, 14th, and 15th of January 1994. Each paper has been properly refereed in accordance with the standard procedures used for a regular Journal of Econometrics article, with two or more referees, of which at least one not being a contributor to the issue. As the Annals editors we wish to express our gratitude for the financial support from the European Union's SPES program and Cátedra Argentaria, which made this conference possible. Moreover, we would like to thank the referees for their carefulness and promptness.