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 Baille, 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.

Oyvind 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 $L^1$ 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 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
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