

STATISTICS COLLOQUIUM

MONDAY, OCTOBER 22, 2007

TALK: 4:00 PM — SCIENCE CENTER RM. 309

RECEPTION: 5:15 PM — SCIENCE CENTER, RM. 302

“Stochastic change-point ARX-GARCH models and their applications to
econometric time series”

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ABSTRACT

After more than two decades of research on volatility, one of unsolved problems is the separation of the state of the (long-run) economy and (short-run) financial volatility. This can be explained by two time scales in the underlying time series model with the “long” time scale of model parameters shift and the “short” time scale of the model dynamics. To solve this problem, we consider a class of stochastic change-point ARX-GARCH models, in which the regression coefficients and unconditional variances of innovations may undergo occasional jumps with the number, locations and magnitude of jumps unknown, and the short-run variance oscillations follow a GARCH process. As the model involves two different kinds of nonlinearity --- unknown multiple change points in model parameters and local GARCH processes, we develop an efficient estimation procedure for the time-varying coefficients and local volatilities, which modifies and synthesizes the maximum likelihood estimation in the classical AR-GARCH model without change-points and analytical solutions from the recent advances in multiple change-points models. The proposed model not only reduces the persistence of conditional volatilities in the standard GARCH models, but also incorporates the shifts among unknown number of economic states. Applications to financial data and risk management are also given.

Link: <http://www.stat.columbia.edu/~xing/>