

Workshop on Markov Switching Time Series Models
25-27 August 2008
Hotel de l'Olivery
10, rue du 4 septembre, Aix en Provence

Direction:

The workshop is taking place in the old town center of Aix in a street perpendicular to Cour Mirabeau.

Contact: Benoit Mojon: 00 33 (0)6 3259 3805. Mathilde Martelli: 0033 (0)4 4291 4834

Schedule:

Monday 25 August

9:00 to 12:00 **Christopher Sims** (Princeton University): General introduction to the workshop. Bayesian VARs. Choice of priors. Estimation of Bayesian VARs with dummy observations.

14:00 to 17:00 Tutored class: estimation of Bayesian VARs with dummy observations. Application to VAR models of selected OECD countries.

Tuesday 26 August

9:00 to 12:00 **Benoit Mojon** (Banque de France) and **Daniel Waggoner** (FRB Atlanta): Markov switching VARs.

14:00 to 17:00 Tutored class: Specification and estimation of Markov switching VARs. Application to the US Business cycle and the transmission of monetary policy in EMU.

Wednesday 27 August

9:00 to 12:00 **Tao Zha** (FRB Atlanta): State space representation of structural models and estimation of time varying parameters.

14:00 to 17:00 Tutored class: Specification and estimation of New Keynesian model of the US and the euro area.

Coffee breaks at 10:30 and 15:30 every day of the workshop.

Objective:

Introduce Markov Switching Time Series Models to advanced Ph D students and professional economists. The topics to be covered include Bayesian VARs, Markov Switching VARs and structural models with time varying parameters. On each of these topics, the morning session will take the form of a formal presentation of the concepts used in the formulation and estimation of the econometric models. The afternoon sessions will consist of tutored implementation of the estimation procedures reviewed in the morning. Data and generic programs will be distributed and taught to the student so that they master the estimation of Markov Switching Time Series Models by the end of the workshop. The workshop will be animated by Benoit Mojon, Christopher Sims, Daniel Waggoner and Tao Zha.

Markov Switching Time Series Models:

It is widely believed that economic structures have fundamentally changed over past several decades. Recent research has aimed at answering a litany of questions related to quantitative effects of such changes. What were the real effects on the European economy when Europe moved to a single-currency regime? What were the consequences when Argentina moved from a stable inflation economy to a hyperinflation regime or vice versa? Was a "bad" fiscal policy a cause of hyperinflation? Has the inflation target changed over time? What were the consequences of structural changes in the housing market? Answers to these questions require new econometric models that go beyond simply splitting the sample and treating the parameters constant within each subsample.

Markov-switching structural models have proven to be effective ways to address the afore-mentioned questions. As a result of technical advances that have recently been made by (Sims and Zha 2006, and Sims, Waggoner and Zha 2006), it has become feasible to estimate dynamic multiple-equation models and rational expectations models with interesting regime switches in driving processes (shock variances and government policy variables such as the inflation target).

Markov-switching modeling research soars because it has a wide range of economic applications by ways of making the transition matrix flexible. The parameterization can remain parsimonious while one expands the number of regimes by constraining the transition matrix to a form that concentrates along its diagonal. There would be no computational problem in such an expansion if the transition matrix is restricted to depend on no more than 3 or 4 parameters. Consequently, this approach encompasses continuous coefficient-drifting models because it allow for both occasional discontinuous shifts in regime and more frequent incremental changes (Sims and Zha, 2006; and Smith, 2002).

In this workshop, we will present lectures on econometric methods and practical algorithms for Markov-switching structural models. We will discuss a numerous ways of model Markov processes with flexible transition matrices. This flexibility, for example, allows one to separate a Markov process for coefficients from a process controlling regime changes in shock variances.

The topics include a general Bayesian perspective, maximum likelihood estimation (MLE), Markov-Chain Monte Carlo (MCMC) methods, computer programs and algorithms that are free of charge, and a number of practical economic models that are designed to provide participants with hands-on experiences.

In application, we focus on two classes of models. The first class is composed of structural vector autoregression (VAR) models and the second concerns dynamic stochastic general-equilibrium (DSGE)

models. Both classes of models have been widely used in central banks for policy analysis and projections.

Requirements:

Participants should have a graduate degree in or a professional experience of time series econometrics and bring their own, Matlab or Octave equipped laptops to the workshop.

Main References:

Sims, C. A. (2001): "Stability and Instability in US Monetary Policy Behavior," Manuscript, Princeton University.

Sims, C. A., D. F. Waggoner, and T. Zha (2006): "Methods for Inference in Large Multiple-Equation Markov-Switching Models," Federal Reserve Bank of Atlanta Working Paper 2006-2, forthcoming, *Journal of Econometrics*.

Sims, C. A., and T. Zha (2006): "Were There Regime Switches in US Monetary Policy?," *American Economic Review*, 96, 54-81.

Smith, D. R. (2002): "Markov-Switching and Stochastic Volatility Diffusion Models of Short-Term Interest Rates," *Journal of Business & Economic Statistics*, 20(2), 183-197.