

**International Conference on
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Centre for Econometric Analysis (CEA@Cass)
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S. Lazarova (Queen Mary University of London, UK)
L. Trapani (Cass, UK, and Università’ di Bergamo, Italy)
Giovanni Urga (Cass Business School, UK)

INVITED SPEAKERS:

Jushan Bai (New York University, USA)

“Common breaks in panel data”

Abstract. We present some unique features of break point estimation in panel data. These features are not shared by univariate series. For example, in the univariate setting, the break point cannot be consistently estimated in terms of the integer-valued time index, although consistency is possible in terms of the fraction of the sample size. For panel data, however, as the number of series with the common break increases, we show that the break point can be consistently estimated. We also show that consistency is possible whether the sample size is finite or goes to infinity, and even when a regime has a single observation. Numerical simulations corroborate these theoretical results. Furthermore, we propose a new framework for developing the limiting distribution for the estimated break point, and show how to construct confidence intervals for the break point. The estimation method is based on least squares and is easy to implement. The proposed method is applied to the study of common breaks in output growth among a group of developed countries.

David Hendry (Economics Department, Oxford, UK)

“Forecasting, structural breaks and non-linearities”.

(With Jennifer L. Castle)

Abstract. The paper synthesizes our six strands of research on forecasting location shifts—the main source of forecast failure. After reviewing predictability, its properties, and relation to forecastability, we evaluate taxonomies of forecast errors, showing that disaggregation over variables, or time, does not mitigate the impacts of breaks. Thirdly, we consider the detection of location shifts using impulse saturation techniques, also important in the fourth strand of formulating, testing for, and modelling non-linearity, where many sub-problems need solved en route. Next, we consider combining different forecasting devices versus exploiting their differential robustness to breaks, and intercept corrections. Finally, we discuss estimating forecast-error uncertainty, again drawing on impulse saturation

Pierre Perron (Boston University, USA)

“Assessing the relative power of structural break tests using a framework based on the approximate Bahadur slope”

(with Dukpa Kim).

We compare the asymptotic relative efficiency of the Exp, Mean, and Sup functionals of the Wald, LM and LR tests for structural change introduced by Andrews and Ploberger (1994). We derive the approximate Bahadur slopes of these tests using large deviations techniques. These show that tests based on the Mean functional are inferior to those based on the Sup and Exp when using the same base statistic. Also, for a given functional, the Wald test dominates the LR, which dominates the LM. We show that the Sup and Mean type tests satisfy Wieand's (1976) condition so that their slopes yield the limiting (as the size tends to zero) asymptotic relative Pitman efficiency. Using this measure of efficiency, the Mean type tests are inferior to the Sup. We also compare tests based on the Wald and LM statistics modified with a HAC estimator. In this case, the inferiority of the LM-based tests and the Mean functional is especially pronounced. The relevance of our theoretical results in finite samples is assessed via simulations. Our results are in contrast to those of Andrews and Ploberger (1994) based on a local asymptotic framework and our analysis thereby reveals its potential weaknesses in the context of structural change problems.

Hashem Pesaran (University of Cambridge, UK and USC, USA)

“Learning, structural instability and present value calculations”

(With Davide Pettenuzzo, University of Bocconi and Bates and White; Allan Timmermann, University of California San Diego)

Abstract. Present value calculations require predictions of cash flows both at near and distant future points in time. Such predictions are generally surrounded by considerable uncertainty and may critically depend on assumptions about parameter values as well as the form and stability of the data generating process underlying the cash flows. This paper presents new theoretical results for the existence of the infinite sum of discounted expected future values under uncertainty about the parameters characterizing the growth rate of the cash flow process. Furthermore, we explore the consequences for present values of relaxing the stability assumption in a way that allows for past and future breaks to the underlying cash flow process. We find that such breaks can lead to considerable changes in present values.

Peter Robinson (London School of Economics, UK)

“Semiparametric inference in multivariate fractionally cointegrated systems”

(with Javier Hualde, Universidad de Navarra).

Abstract. A semiparametric multivariate fractionally cointegrated system is considered, integration orders possibly being unknown and $I(0)$ unobservable inputs having nonparametric spectral density. Two estimates of the vector of cointegrating parameters v are considered. One involves inverse spectral weighting and the other is unweighted but uses a spectral estimate at frequency zero. Both corresponding Wald statistics for testing linear restrictions on v are shown to have a standard null χ^2 limit distribution under quite general conditions. Notably, this outcome is irrespective of whether cointegrating relations are "strong" (when the difference between integration orders of observables and cointegrating errors exceeds $1/2$), or "weak" (when that difference is less than $1/2$), or when both cases are involved. Finite-sample properties are examined in a Monte Carlo study.

Neil Shephard (Nuffield College, Oxford, UK)

"Measuring the impact of jumps on multivariate price processes using bipower variation."

Realised bipower variation consistently estimates the quadratic variation of continuous component of prices. In this paper we generalise this concept to realised bipower covariation, study its properties, illustrate its use, derive its asymptotic distribution and use it to test for jumps in multivariate price processes.

TITLES AND ABSTRACTS OF PAPERS ACCEPTED FOR PRESENTATION

Monotonic power in tests for structural change in the mean.

Elena Andreou (*Department of Economics, University of Cyprus, Cyprus*).

Abstract. A family of tests for structural changes in the mean of a temporally dependent process can exhibit non-monotonic power which can even go to zero as the alternative considered is further away from the null value (Perron, 1991, Vogelsang, 1999). The problem arises for persistent processes that involve a Heteroskedastic and Autocorrelation Consistent (HAC) estimator. This paper shows that a near-stationarity boundary condition for HAC estimators can solve the problem of non-monotone power of structural break tests for a single break in the mean of a weakly dependent process.

Inference on the time of break

Stepana Lazarova (*Queen Mary University of London, UK*) and Javier Hidalgo (*London School of Economics, UK*)

Abstract. Abstract: The asymptotic distribution of the estimator of the break point in a linear regression model depends on the unknown underlying distribution of data and thus it is not available for inference purposes. To circumvent this drawback, the paper proposes a bootstrap procedure that is valid for linear stationary processes. The approach is based on a specific type of deconvolution. It has the advantage of avoiding the artificial technical assumption that the size of break shrinks to zero as the sample size increases, which, despite yielding distribution-free asymptotics, may not always be seen as acceptable.

GLS-based unit root tests with multiple structural breaks both under the null and the alternative hypotheses

Josep Lluís Carrion-i-Silvestre (*University of Barcelona, Spain*), Dukpa Kimy (*Boston University, USA*), and Pierre Perron (*Boston University, USA*)

Abstract. This paper proposes M-class unit root tests that allow for the presence of multiple structural breaks that might affect the level and/or the slope of the time series both under the null and the alternative hypotheses. We show that the minimization of the sum of the squared residuals of the quasi-differenced model gives consistent

estimates of the break fractions with a rate of convergence that ensures that the unit root test statistics have the same limiting distribution as when the break points are assumed to be known. Furthermore, we propose a dynamic algorithm to estimate the multiple break points in an efficient way. The paper provides with response surfaces to approximate the parameter that is used in the quasi-differencing and the percentiles of interest for each test statistic. The performance of the statistics is investigated through Monte Carlo simulations

Doing justice to fundamentals in exchange rate forecasting: a control over estimation risk

Biing-Shen Kuo (*National Chengchi University, Taipei, Taiwan*)

Abstract. A shrinkage estimator that accounts for estimation risks is developed and employed to re-access whether the monetary fundamentals help predict changes in exchange rates. While the estimation risk in term of mean squared errors takes place in the presence of parameter uncertainties, it is more problematic in the context of the exchange rate predictive regression where the time series under study are typically short and the predictors are highly persistent. Monte-Carlo simulations clearly demonstrate that comparing to the least-square estimator, the magnitude of estimation errors associated with our shrinkage estimator is 10% to 35% less. Moreover, the risk reductions convert into sizable power gains for tests for predictability, yielding a robust inference. In contrast to the previous studies, a uniform evidence of the higher ability of monetary fundamentals to forecast exchange rate movements is now found at short horizons, either in-sample or out-of-sample.

Testing for cointegration with structural breaks based on subsamples

James Davidson (*University of Exeter, UK*) and Andrea Monticini (*University of Exeter, UK*)

Abstract. This paper considers tests for cointegration with allowance for structural breaks, using the extrema of residual-based tests over subsamples of the data. One motivation for the approach is to formalize the practice of data snooping by practitioners, who may examine subsamples after failing to find a predicted cointegrating relationship. Valid critical values for such multiple testing situations may be useful. The methods also have the advantage of not imposing a form for the alternative hypothesis, in particular slope vs. intercept shifts and single versus multiple breaks, and being comparatively easy to compute. A range of alternative subsampling procedures, including sample splits, incremental and rolling samples are tabulated and compared experimentally.

Semiparametric estimation and inference for trending $I(d)$ and related processes

Karim M. Abadir (*Tanaka Business School, London*), Walter Distaso (*Tanaka Business School, London*), Liudas Giraitis (*QMUL, London*)

Abstract. This paper deals with estimation and hypothesis testing in models allowing for trending processes that are possibly nonstationary, nonlinear, and non-Gaussian. Using semiparametric estimators, we obtain asymptotic confidence intervals for the

trend and memory parameters, and we develop joint hypothesis testing for these. The confidence intervals are applicable for a wide class of processes, exhibit high coverage accuracy, and are easy to implement.

Efficient Bayesian inference for multiple change-point and mixture innovation models

Paolo Giordani (*Research Department, Swedish Central Bank, Sweden*), and Robert Kohn (*School of Economics, School of Banking and Finance University of New South Wales*)

Abstract. Time series subject to parameter shifts of random magnitude and timing are commonly modeled with a change-point approach using Chib's (1998) algorithm to draw the break dates. We outline some advantages of an alternative approach in which breaks come through mixture distributions in state innovations, and for which the sampler of Gerlach, Carter and Kohn (2000) allows reliable and efficient inference. We show how the same sampler can be used to model shifts in variance that occur independently of shifts in other parameters and how to draw the break dates efficiently when regime durations follow a Poisson process. Finally, we introduce to the time series literature the concept of adaptive Metropolis-Hastings sampling for discrete latent variable models. We develop an easily implemented adaptive algorithm that improves on Gerlach et al. (2000) and promises to significantly reduce computing time in a variety of problems including mixture innovation, change-point, regime-switching, and outlier detection. The efficiency gains on two models for U.S. inflation and real interest rates are 257% and 341%.

Testing for breaks in the order of integration of G7 inflation and interest rates

Andreea Halunga (*School of Business and Economics, University of Exeter, UK*), Denise R. Osborn (*Centre for Growth and Business Cycle Research Economics University of Manchester, UK*), and Marianne Sensier (*Centre for Growth and Business Cycle Research Economics University of Manchester, UK*)

Abstract. In this paper we test G7 inflation and interest rates for changes in persistence either from $I(1)$ to $I(0)$ or $I(0)$ to $I(1)$ employing the modified tests of Harvey, Leybourne and Taylor (2006) that are based on the ratio statistics of Busetti and Taylor (2004) with a null of $I(0)$ throughout the sample. We also extend these procedures to allow possible structural breaks in the level of the series, implementing a simultaneous search procedure for deterministic level shifts and persistence changes. Our results show for the G7 that there is a change in inflation persistence from $I(1)$ to $I(0)$ behaviour for all countries in the mid-1970s or early 1980s with the single exception of Germany. For the interest rate series, most of the modified statistics indicate corresponding changes in behaviour, but this change occurs later than for inflation. For both series, estimated mean shifts almost always occur after the change to stationarity.

Testing for multiple structural changes in cointegrated regression models

Mohitosh Kejriwal (*Boston University, USA*) and Pierre Perron (*Boston University, USA*)

Abstract. This paper considers issues related to testing for multiple structural changes in cointegrated systems. We derive the limiting distribution of the Sup-Wald test

under mild conditions on the errors and regressors for a variety of testing problems. Our asymptotic results show that as long as the intercept is allowed to change across regimes, inference is possible even if we allow stationary variables in the regression. We also find that including stationary regressors whose coefficients are not allowed to change does not affect the limiting distribution of the tests under the null hypothesis. We propose a procedure that allows one to test the null hypothesis of, say, k changes, versus the alternative hypothesis of $k + 1$ changes. This sequential procedure is useful in that it permits consistent estimation of the number of breaks present. When the regression is spurious, we show that the procedure tends to select the maximum number of breaks allowed. This feature helps distinguish a cointegrated model from a purely spurious one. Our simulation experiments show that in the presence of serial correlation in the errors, the commonly used LM tests suffer from the important problem of nonmonotonic power in finite samples. In fact, in certain cases, power can go to zero as the magnitude of the break(s) increase. We propose a modified Wald test based on a new estimator of the long run variance which uses information under both the null and alternative hypotheses. The proposed test is able to mitigate size distortions associated with the usual Wald test while maintaining monotonic power.

Testing for structural breaks and other forms of non-stationarity: a misspecification perspective

Maria S. Heracleous (*American University, Washington DC, USA*), Andreas Koutrisy (*Virginia Tech, Blacksburg, USA*) and Aris Spanos (*Virginia Tech, Blacksburg, USA*)

Abstract. In the 1980s and 1990s the issue of non-stationarity in economic time series has been discussed in the context of unit roots vs. mean trends in AR(p) models. More recently this perspective has been extended to include structural breaks. In this paper we take a much broader perspective by viewing the problem of changing parameters as one of misspecification testing due to the non-stationarity of the underlying process. The proposed misspecification testing procedure relies on resampling techniques to enhance the informational content of the observed data in an attempt to capture heterogeneity “locally” using rolling window estimators of the primary moments of the stochastic process. The effectiveness of the testing procedure is assessed using extensive Monte Carlo simulations.

Pivotal structural change tests in linear simultaneous equations with weak identification

Mehmet Caner (*Pittsburgh University, USA*)

Abstract. This paper introduces pivotal structural change tests in structural equation/reduced form equation system with weak identification. We extend the structural change test of Andrews (1993) to weakly identified linear systems. We show that sup LM test of Andrews (1993, *Econometrica*) is oversized and has power problems when there is weak identification. This paper relies also on the optimal test statistics introduced by Moreira (2003, *Econometrica*). So we extend his approach to structural change tests.

Structural change tests that are boundedly pivotal in nonlinear GMM is developed recently by Caner (2006, *J. of Econometrics Forthcoming*). But since these are boundedly pivotal they can waste power. The statistics that are introduced here are

different than the nonlinear ones introduced in Caner (2006, *J. of Econometrics*, Forthcoming) and they also tackle autocorrelation much better. In line with empirical likelihood literature, we use smoothed scores to adjust for time series correlation which is new in structural change literature.

Our test statistics can be tabulated easily and robust to heteroskedasticity and autocorrelation.

Multivariate modelling of long memory processes with common components

Claudio Morana (*University of Piemonte Orientale, Novara, Italy, and International Centre for Economic Research, Torino, Italy*)

Abstract. In the paper a new approach to the modelling of common components in long memory processes is introduced. The approach is based on a two-step procedure relying on Fourier transform methods (first step) and principal components analysis (second step), which, differently from previous contributions to the literature, allows the application of the methodology to large data sets, both in terms of temporal and cross-sectional dimensions. Monte Carlo evidence, supporting the two-step estimation procedure, is also provided, as well as an empirical application to real data.

Estimation of threshold cointegration

Myung Hwan Seo (*London School of Economics, USA*)

Abstract. This paper establishes the consistency and convergence rate of the least squares (LS) and smoothed least squares (SLS) estimator of the threshold cointegration model in a vector error correction framework. The convergence rates of the cointegrating vector estimates are faster than the standard n -rate, which can be obtained in a linear cointegration model, while those of threshold estimates and slope estimates are the same as in a stationary threshold model. We also derive asymptotic distributions. The slope estimates, both LS and SLS estimates, are asymptotically normal and independent of the threshold and cointegrating vector estimates. The SLS estimates of the threshold and cointegrating vector converge to a functional of Brownian motions. It is also shown that the SLS estimate of the threshold is asymptotically normal as if the true cointegrating vector were known, if we plug in the LS estimate of the cointegrating vector.

Non-nested model selection in unstable environments

Raffaella Giacomini (*University of California, Los Angeles, USA*)

Barbara Rossi (*Duke University, USA*)

Abstract. We consider non-nested model selection tests in the presence of possible data and parameter instabilities. The novelty of our approach is that we allow the models' relative performance to be varying over time, whereas existing model selection techniques look for an overall best model. We argue that the time path of the models' relative performance may contain useful information that is lost when seeking a model that performs best "on average". We consider two competing nonnested nonlinear and possibly misspecified dynamic models and provide statistical and graphical methods to: (1) analyze the evolution of the models' relative performance over historical samples; and (2) monitor the models' relative performance in real time, as new data becomes available. Our methods are valid under

general data assumptions and can be applied to multivariate models that are estimated by a variety of techniques including ML, GMM and Bayesian methods. An empirical application provides insights into the time variation in the performance of Smets and Wouters' (2003) DSGE model of the European economy relative to that of Bayesian VARs.

Bayesian model averaging in the presence of structural breaks

Francesco Ravazzolo, Richard Paap, Dick van Dijk, and Philip Hans Franses
(*Econometric Institute Erasmus University Rotterdam, Netherlands*)

Abstract. This paper develops a return forecasting methodology that allows for instability in the relationship between stock returns and predictor variables, for model uncertainty, and for parameter estimation uncertainty. The predictive regression specification that is put forward allows for occasional structural breaks of random magnitude in the regression parameters, and for uncertainty about the inclusion of forecasting variables and about the parameter values by employing Bayesian Model Averaging. The implications of these three sources of uncertainty, and their relative importance, are investigated from an active investment management perspective. It is found that the economic value of incorporating all three sources of uncertainty is considerable. A typical investor would be willing to pay up to several hundreds of basis points annually to switch from a passive buy-and-hold strategy to an active strategy based on a return forecasting model that allows for model and parameter uncertainty as well as structural breaks in the regression parameters.

A Markov chain Monte Carlo method for fractionally integrated, autoregressive, moving average, stochastic volatility,

Mark J. Jensen (*Federal Reserve Bank of Atlanta, USA*)

Abstract. In this paper a Bayesian estimator of the fractionally integrated, autoregressive, moving average, stochastic volatility model's (ARFIMA-SV) short and long-memory parameters is presented. The estimator of the short and long-memory parameters is based on the highly efficient, Markov chain Monte Carlo sampler of Jensen (2004). Like Jensen's (2004) semiparametric Bayesian estimator of the fractional differencing parameter, the MCMC algorithm is carried out in the time-scale domain of the stochastic volatility model's wavelet representation. But, unlike Jensen's (2005), this paper's estimator is fully parametric and simultaneously estimates volatility's short and long-memory parameters. Using simulated and empirical stock return data, we find that our Bayesian estimator produces good point estimates of the ARFIMA-SV model's autoregressive and fractional differencing parameters.

What is what? A simple time-domain test of long-memory vs. structural breaks

Juan J. Dolado (*Dept. of Economics, Universidad Carlos III de Madrid*), Jesus Gonzalo (*Dept. of Economics, Universidad Carlos III de Madrid*), Laura Mayoral (*Dept. of Economics, Universitat Pompeu Fabra*)

Abstract. This paper proposes a new time-domain test of a process being $I(d)$, $0 < d \leq 1$, under the null, against the alternative of being $I(0)$ in the presence of deterministic

components subject to structural breaks at known or unknown dates, with the goal of disentangling the existing identification issue between long-memory and structural breaks. Denoting by $A_{\{B\}}(t)$ the different types of structural breaks in the deterministic components of a time series considered by Perron (1989), the test statistic proposed here is based on the t-ratio (or the infimum of a sequence of t-ratios) of the estimated coefficient on y_{t-1} in an OLS regression of $\Delta^d y_t$ on a simple transformation of the above-mentioned deterministic components and y_{t-1} , possibly augmented by a suitable number of lags of $\Delta^d y_t$ to account for serial correlation in the error terms. The case where $d=1$ coincides with the Perron (1989) or the Zivot and Andrews (1992) approaches if the break date is known or unknown, respectively. The statistic is labelled as the SB-FDF (Structural Break-Fractional Dickey- Fuller) test, since it is based on the same principles as the well-known Dickey-Fuller unit root test. Both its asymptotic behavior and finite sample properties are analyzed, and two empirical applications are provided.

Forecasting and estimating multiple change-point models with an unknown number of change-points

Gary Koop (*University of Strathclyde, Glasgow U.K.*) and Simon M. Potter (*Federal Reserve Bank of New York, USA*)

Abstract. This paper develops a new approach to change-point modelling that allows the number of change-points in the observed sample to be unknown. The model we develop assumes regime durations have a Poisson distribution. It approximately nests the two most common approaches: the time varying parameter model with a change-point every period and the change-point model with a small number of regimes.

We focus considerable attention on the construction of reasonable hierarchical priors both for regime durations and for the parameters which characterize each regime. A Markov Chain Monte Carlo posterior sampler is constructed to estimate a change-point model for conditional means and variances. Our techniques are found to work well in an empirical exercise involving US GDP growth and inflation.

Empirical results suggest that the number of change-points is larger than previously estimated in these series and the implied model is similar to a time varying parameter (with stochastic volatility) model.

Simple (but effective) tests of long memory versus structural breaks

Katsumi Shimotsu (*Department of Economics, Queen's University, Canada*)

Abstract. This paper proposes two simple tests that are based on certain time domain properties of $I(d)$ processes. First, if a time series follows an $I(d)$ process, then each subsample of the time series also follows an $I(d)$ process with the same value of d . Second, if a time series follows an $I(d)$ process, then its d th differenced series follows an $I(0)$ process. Simple as they may sound, these properties provide useful tools to distinguish the true and spurious $I(d)$ processes. In the first test, we split the sample into b subsamples, estimate d for each subsample, and compare them with the estimate of d from the full sample. In the second test, we estimate d by the local Whittle estimator, use the estimate to take the d th difference of the sample, and apply the KPSS test and Phillips-Perron test to the differenced data and its partial sum. Simulations show that the proposed tests have good power against the spurious long

memory models considered in the literature. The tests are applied to S&P 500 absolute daily return data.

On distinguishing between random walk and changes in the mean alternatives.

Alexander Aue (*University of Utah, Salt Lake City, USA*), Lajos Horvath (*University of Utah, Salt Lake City, USA*), Marie Huskova (*Charles University, Praha, Czech Republic*), and Shiqing Ling (*Hong Kong University, Hong Kong, China*)

We discuss test procedures that detect structural breaks in underlying data sequences. In particular, we wish to discriminate between different reasons for the breaks, such as (1) shifting means, (2) random walk behavior, and (3) constant means but innovations switch from stationarity to difference stationarity. Almost all procedures presently available in the literature are simultaneously sensitive to all three types of alternatives. The test statistics under consideration here are based on functionals of the partial sums of observations. These CUSUM-type statistics have limit distributions if the mean remains constant and the errors satisfy the central limit theorem, but tend to infinity in the case any of the alternatives (1), (2) or (3) holds. On removing the effect of the shifting mean, however, divergence of the test statistics will only occur under the random walk behavior, which in turn enables statisticians to not only detect structural breaks but also to specify their causes

Finite sample multivariate structural change tests with application to energy demand models

Jean-Thomas Bernard (*Université Laval, Canada*), Nadhem Idoudi (*Hydro-Québec, Canada*), Lynda Khalaf (*Université Laval, Canada*), and Clément Yélou (*Université Laval, Canada*)

Abstract. This paper considers finite sample motivated structural change tests in the Multivariate Linear Regression model with application to energy demand models, in which case commonly used structural change tests remain asymptotic. As in Dufour and Kiviet (1996), we account for intervening nuisance parameters through a two-stage maximized Monte Carlo test procedure. Our contributions can be classified in five categories: (i) we extend tests for which a finite-sample theory has been supplied for Gaussian distributions to the non-Gaussian context; (ii) we show that Bai, Lumsdaine and Stock (1998)'s test severely over-rejects and propose exact variants of this test; (iii) we consider predictive break test approaches which generalize tests in Dufour (1980) and Dufour and Kiviet (1996); (iv) we propose exact (non-Bonferonni based) extensions of the multivariate outliers test from Wilks (1963) to models with covariates; (v) we apply these tests to the energy demand system analyzed by Arsenault, Bernard, Carr and Genest-Laplante (1995). For two out of the six industrial sectors analyzed over the 1962-2000 period, break and further Goodness-of-fit and diagnostic tests allow to identify (and correct) specification problems arising from historical regulatory changes or (possibly random) industry-specific effects. The procedures we propose have potential useful applications in statistics, econometrics and finance (e.g. event studies).

Estimation and inference in unstable nonlinear least squares models

Otilia Boldea (*Department of Economics, North Carolina State University, USA*),
Alastair Hall (*Department of Economics, North Carolina State University, USA*), and
John J. Seater (*Department of Economics, North Carolina State University, USA*)

Abstract. In our paper we consider an unstable univariate nonlinear least squares (NLS) model with a limited number of parameter shifts at unknown dates. Under empirically plausible assumptions, we show that a simple minimization of sum of squared residuals, but over all possible break dates and parameters, yields consistent estimates of both change points and parameters. Additionally, we derive rates of convergence of break dates, asymptotic distributions of the parameters and propose several instability tests. This approach was initially proposed by Bai and Perron (1998), but in a linear setting. Using nonlinear asymptotic theory, we are able to show that their method carries over to a NLS model. To demonstrate the usefulness of this result for economic purposes, we revisit the permanent income hypothesis. In this model, policy regime shifts, such as permanent changes in marginal tax rates, can change permanent consumption. The application is in progress.

Testing for a Change in persistence in the presence of non-stationary volatility

Giuseppe Cavaliere (*Department of Statistical Sciences, University of Bologna*)

A.M. Robert Taylor (*School of Economics, University of Nottingham*)

Abstract. In this paper we consider tests for the null of (trend-) stationarity against the alternative of a change in persistence at some (known or unknown) point in the observed sample, either from $I(0)$ to $I(1)$ behaviour or vice versa, of, inter alia, Kim (2000). We show that in circumstances where the innovation process displays non-stationary unconditional volatility of a very general form, which includes single and multiple volatility breaks as special cases, the ratio based statistics used to test for persistence change do not have pivotal limiting null distributions. Numerical evidence suggests that this can cause severe oversizing in the tests. In practice it may therefore be hard to discriminate between persistence change processes and processes with constant persistence but which display time-varying unconditional volatility. We solve the identified inference problem by proposing wild bootstrap-based implementations of the tests. Monte Carlo evidence suggests that the bootstrap tests perform well in finite samples. An empirical application to a variety of measures of U.S. price inflation data is provided.

Modelling and testing for structural breaks in panels with common and idiosyncratic stochastic trends

Chihwa Kao (*Syracuse University, USA*), Lorenzo Trapani (*Cass Business School, UK and Bergamo University, Italy*), Giovanni Urga (*Cass Business School, UK*)

Abstract. This paper studies testing for detecting a break at an unknown date in panel data with common stochastic and idiosyncratic trends. To model the common stochastic trends, we assume that the data is generated by common factors. We propose tests and derive their limiting distributions under the null of no change point. We derive the limiting distribution and the proposed test and tabulate the critical values. Monte Carlo simulations are performed to examine the size and power of the proposed tests

Semiparametric detection of changes in long range dependence

Fabrizio Iacone (York University, UK) and Stepana Lazarova (Queen Mary University of London, UK)

Abstract. We discuss changes in the order of integration of a strongly dependent process. In order to concentrate on the long term dynamics, we employ the local Whittle estimate which uses only frequencies local to zero. We propose a test to detect the break in the long run dynamics. The limit distribution of the test statistic under the null is not standard, but it is well known in the literature. We also propose a procedure to estimate the location of a break when it is present. We show that both the test procedure and the estimate of the location of the break are robust to instability in the short term dynamics. A Monte Carlo study shows that our inference procedures perform well in small samples. The methods are used to analyse the persistence in inflation in countries of the European Monetary Union

Asymmetries, breaks, and long-range dependence in realized volatility: a simultaneous equations approach

Eric Hillebrand (*Louisiana State University, Baton Rouge, USA*) and Marcelo C. Medeiros (*Louisiana State University, Baton Rouge, USA*)

Abstract. The problem of unobservability of volatility that plagued earlier approaches of financial modelling has at least partially been resolved by the concept of realized volatility. Recent theoretical developments provide consistent estimators of daily integrated variance in diffusion environments and standard time-series models have been used to model and forecast future daily volatility. The time series of realized volatility exhibit long-range dependence and non-linearity. Commonly discussed types of non-linearity include the leverage effect and structural breaks. In this paper, we propose a Lagrange-Multiplier test based on a neural network sieve approximation for nonlinearity of general type (structural breaks, thresholds, etc.) in the presence of long memory. We specify a simultaneous system of equations for returns and realized volatility. The system allows for general nonlinear functions in the volatility equation. We estimate both the sieve approximation and selected parametric specifications, including leverage and break functions. We apply our methodology to sixteen Dow Jones Industrial Average index stocks using transaction level data from the Trades and Quotes database covering the period 3-Jan-1994 to 31-Dec-2003. We find strong support for our model approach in forecast performance evaluations.

Giovanni Urga

Thursday, 30 November 2006