A Modified Lee-Mykland Test for Jumps in the Presence of Seasonality

Abstract. Lee and Mykland (2008) introduced the first nonparametric test that can detect the high-frequency returns affected by jumps. It is based on the intraday return standardized by a robust scale estimate of the contiguous intraday returns. We show that in the presence of a strong intraday seasonality pattern in volatility, the Lee-Mykland test overdetects (underdetects) jumps in periods of relatively high (low) seasonality. We propose to adjust the Lee-Mykland test statistic such that it accounts for the seasonal variation in the intraday return volatility. For this we use a modification of Taylor and Xu’s (1997) scale-based and Andersen and Bollerslev’s (1997) regression-based seasonality estimators that is more robust to jumps in the data. We illustrate this new method on the 5-minute returns of the EUR/USD exchange rate and find that robust methods are especially needed to estimate the seasonality of the returns for the time intervals in which often macroeconomic news is released.


Abstract. We use high frequency data (BrokerTec US Treasury data on the 2-, 5-, 10- and 30-year bonds) to examine and compare the results of alternative univariate jump tests recently proposed in the literature, as a first step to evaluate the performance of these tests. The following tests are considered: Aït-Sahalia and Jacod (2008), Andersen, Bollerslev and Dobrev (2007), Barndorff-Nielsen and Shephard (2005), Jiang and Oomen (2006), Lee and Mykland (2007) and Mancini (2001). We are interested in identifying which tests are likely to exhibit more power, as well as in determining how the sampling frequency affects the jump identification for different tests. Moreover, we investigate how bond prices react to different types of (scheduled/ non-scheduled) information releases.

Co-breaking, Cointegration, and Weak Exogeneity: Modelling Aggregate Consumption in Japan

Abstract. This paper aims to estimate a parsimonious dynamic econometric model for aggregate real consumption in Japan. Testing co-breaking, cointegration and weak exogeneity plays an important role in pursuing the model reduction. It is demonstrated that co-breaking removes a deterministic shift caused by the collapse of the bubble economy in Japan in the early 1990s. Multivariate cointegration analysis then reveals that inflation plays a critical role in accounting for the long-run behaviour of the aggregate consumption. Further analysis finds that inflation and aggregate income are weakly exogenous with respect to a set of parameters of interest. Finally, a parsimonious equilibrium correction model for the aggregate consumption is estimated conditional on the set of weakly exogenous variables.

An Automatic Test of Super Exogeneity

Abstract. We develop a new automatically-computable test for super exogeneity, using a variant of general-to-specific modelling. Based on the recent developments of impulse saturation applied to marginal models under the null that no impulses matter, we select the significant impulses for testing in the conditional. Since zero-mean changes are relatively undetectable in both VARs and conditional equations, we focus on location shifts although we also discuss variance changes. The approximate analytical non-centrality of the test is derived for a failure of weak exogeneity when there are shifts in the marginal process.
Monte Carlo simulations confirm the empirical accuracy of the nominal significance levels under the null, and show rejections for this failure of super exogeneity. An empirical application to UK M1 delivers new results for this much-studied data set.

Further Applications of Econometric Modelling With More Variables than Observations

Abstract. Automatic model selection procedures form an increasingly important tool for the empirical modeller. Forward selection methods, such as the thoroughly discredited stepwise regression, or more recent methods such as Lasso, are outperformed by methods based on general-to-specific modeling, such as Autometrics. This is particularly so in dynamic models where the intercorrelations are often high, and the dynamics complex. In macro-economic or dynamic marketing applications using monthly or weekly data, it can easily happen that there are more variables than observations. Forward selection methods can handle this situation. General-to-specific modelling on the other hand cannot proceed, because the initial model is unidentified.

Another, example is that of a structural break. In allowing for a break, it is of interest to add a dummy variable for every observation. Such impulse saturation would lead to a perfect fit, and was, until recently, considered infeasible. Autometrics, however, can proceed in the case of impulse saturation, with a fairly high power of detecting the break. Forward selection methods have zero power here: no outlier is detected at all.

The objectives of this paper are

1. to make automatic modelling operational when there are more variables than observations;
2. to investigate the performance of the proposed procedures using Monte Carlo methods;
3. to provide a comparison with some forward selection methods, and to consider some new applications of the procedure. One example is super saturation, where all step breaks and broken trends are added.

Impulse Saturation and the Choice of an Estimation Window for Forecasting

Abstract. When we estimate models for forecasting a frequent question is what window should be used if we suspect that breaks have occurred within the sample. Recently, it has been suggested that it might be wrong to estimate the forecasting model exclusively on data available after the most recent break because of a trade-off between forecast error bias and variance and the difficulties to empirically determine the timing of the break. Also, new research lines have been opened by the Impulse Saturation (IS) algorithm that allows each observation of the sample to be ‘dummied-out’ in particular, robust estimators and a break test for unknown dates could contribute to the window selection. In this paper IS is evaluated for forecasting through Monte Carlo simulations for different kinds of breaks. It is addressed: how IS detects the timing of the breaks, whether or not the post-break estimation improves forecasting performance (in terms of MSFE) and the alternative of “robust” estimation for a temporary break.

Analyzing the Term Structure of Interest Rates using the Dynamic Nelson-Siegel Model with Time-Varying Parameters

Abstract. In this paper we introduce time-varying parameters in the dynamic Nelson-Siegel yield curve model for the simultaneous analysis and forecasting of interest rates of different maturities, known as the term structure. The Nelson-Siegel model has been recently reformulated as a dynamic factor model where
The latent factors are interpreted as the level, slope and curvature of the term structure. The factors are modelled by a vector autoregressive process. We propose to extend this framework in two directions. First, the factor loadings are made time-varying through a simple single step function and we show that the model fit increases significantly as a result. The step function can be replaced by a spline function to allow for more smoothness and flexibility. Second, we investigate empirically whether the volatility in interest rates across different time periods is constant. For this purpose, we introduce a common volatility component that is specified as a spline function of time and scaled appropriately for each series. Based on a data-set that is analysed by others, we present empirical evidence where time-varying loadings and volatilities in the dynamic Nelson-Siegel framework lead to significant increases in model fit. Improvements in the forecasting of the term structure are also reported. Finally, we provide an illustration where the model is applied to an unbalanced dataset. It shows that missing data entries can be estimated accurately.

**Estimation of Factors for Term Structures with Dependence Clusters**

**Abstract.** In estimating term structure factors, a common dependence structure between maturities is implicitly assumed. In this paper we study interactions between factors in the presence of multiple dependencies (with short and long maturity clusters) within a term structure. We introduce the block dynamic Nelson-Siegel model for term structures with maturity clusters for the purpose of forecasting. This new framework generalizes the dynamic representation proposed by Diebold and Li (2006) for constructing yield curve forecasts of the Nelson-Siegel factors and relaxes the assumption of common factor dynamics among clusters within a term structure. In the case of zero coupon term structures, we identify the factors for the short and long maturity clusters separately. Using dependence graphs such as Chi-plots and recursive Kendall plots, we find that factors governing the short and long clusters show loose dependence and therefore measuring factors over separate maturity clusters would lead to significant information gains. Application of the block dynamic Nelson-Siegel model on the term structure of daily zero coupon bond yields with short and long maturity clusters show better out-of-sample forecasting performance than the dynamic representation proposed by Diebold and Li (2006).

**Forecasting Volatility and Value at risk of United Kingdom Natural Gas Futures Prices**

**Abstract.** After deregulation of many energy markets around the world, a need emerged for proper modelling, forecasting, and managing volatility risk. In 2007, over 45% of United Kingdom (U.K.) electricity generation used natural gas as an input. Analyzing fluctuations in the U.K. gas future market is therefore important to energy companies, financial investors, government regulators, as well as to the general public. Forecasting volatility is essential for demand planning and risk management. Good volatility forecasts are needed to optimize trading strategies, assess minimum reserve requirements and expected shortfall. As market risk can be broadly defined as uncertainty in future returns, value-at-risk, the loss in the value of a portfolio for a given probability over a fixed time horizon, has become its standard measure. The challenge is to quantify its value. The U.K. natural gas futures market is characterized by periods of greatly changing volatility. This makes volatility modeling and forecasting a difficult, yet important, task. There have been few studies in this area. We seek to identify the optimal GARCH formulations for modeling volatility in the U.K. natural gas futures positions. After
examining a variety of GARCH models, we find that the RiskMetrics and APGARCH models, with BFGS and/or simulated annealing optimization algorithms, and errors following a t-distribution, model the U.K. natural gas futures positions best. Although the APGARCH generates the lowest Schwartz criteria for all nine contract positions, the model exhibits parameter instability. When applying different forecast evaluation criteria, we find that the APGARCH model with simulated annealing performs well, but the RiskMetrics model may be preferred for particular positions and forecast horizons. We also show how the models may be evaluated using in-sample value-at-risk failure (or success) rates, while examining the implications of the impact of the volatility on the mean equation for demand planners, traders, and risk managers.

**Beta-t-(E)GARCH**

**Abstract.** The GARCH-t model is widely used to predict volatility. However, modeling the conditional variance as a linear combination of past squared observations may not be appropriate if the standardized observations are non-Gaussian. It is argued that a better approach is to subject the observations to a transformation determined by the score of the t-distribution. The fact that the transformed variable has a beta distribution makes it possible to derive the properties of the resulting GARCH and EGARCH models. The proposed EGARCH model has a number of advantages over current formulations, particularly with respect to the existence of moments. A practical consequence is that the conditional variance is more resistant to extreme observations. Extensions to deal with leverage and more than one component are discussed, as are the implications of distributions other than Students.

**Regulation in Oligopolistic Markets with Differentiated Products: The Demand for New Cars**

**Abstract.** In recent years governments have began to explore the role of taxation to effect the relative demand for cars with different CO2 emissions. This paper explores the demand response in the market for new cars subsequent to changes in the pricing of vehicle emissions. Our model is founded upon a number of utility components, principally the average utility of each vehicle choice and variation in utility that derives from both observed and unobserved characteristics. This approach allows for non-proportional substitution and therefore facilitates the estimation of own and cross-elasticities that are consistent with prior expectations. Based upon an assumption of Bertrand pricing our modelling approach accounts for endogeneity of unobserved attributes and price, We present findings utilising a bespoke survey of households together with a database of new car prices and attributes provided by JATO dynamics.

**Optimal Portfolio Allocation using Daily Correlation Modelling**

**Abstract.** Traditional mean-variance efficient portfolios do not capture the potential wealth creation opportunities provided by predictability of asset returns. This paper examines the benefits of actively managed portfolio diversification that accrue to a representative foreign investor who considers international investment opportunities among six major Euro-area countries. To do so, we specify two advanced models for time-varying mean, variances and correlations and compare their results with standard portfolio allocation strategies like the buy-and-hold and fixed weight strategies. Our empirical findings indicate that models incorporating stochastic correlation and volatility result in significantly higher returns than GARCH-based variants or naive portfolio optimisation.
Negative Volatility Spillovers in the Unrestricted ECCC-GARCH Model

Abstract. This paper considers a formulation of the extended constant or time-varying conditional correlation GARCH model which allows for volatility feedback of either sign, i.e., positive or negative. In the previous literature, negative volatility spillovers were ruled out by the assumption that all the coefficients of the model are non-negative, which is a sufficient condition for ensuring the positive definiteness of the conditional covariance matrix. In order to allow for negative feedback, we show that the positive definiteness of the conditional covariance matrix can be guaranteed even if some of the parameters are negative. Thus, we extend the results of Nelson and Cao (1992) and Tsai and Chan (2008) to a multivariate setting. For the bivariate case of order one we look into the consequences of adopting these less severe restrictions and find that the flexibility of the process is substantially increased. Our results are helpful for the model-builder, who can consider the unrestricted formulation as a tool for testing various economic theories.

Outlyingness weighted quadratic covariation

Abstract. Quadratic covariation is a popular descriptive measure for the volatility of a multivariate price process. It is consistently estimated by the sum of outer products of high-frequency returns. The Realized BiPower Covariation (RBPCov) is often used to estimate the quadratic covariation of the continuous component of the price diffusion. This paper introduces the univariate and multivariate versions of the Realized Outlyingness Weighted Quadratic Covariation (ROWQCov) as an alternative to the RBPCov that is robust to jumps affecting two contiguous returns. The new estimator equals a weighted sum of outer products of high frequency returns and down weights returns that, because of jumps or other reasons, are outliers under the Brownian SemiMartingale model. Under this model the ROWQCov is consistent for the integrated covariance matrix and more efficient than the RBPCov. The estimator is affine equivariant and yields positive semidefinite matrices. We illustrate this method on 15-minute return series of the EUR/USD and GBP/USD exchange rates.

Synchronization across Full and Country-Specific Business Cycles in the Euro Zone

Abstract. The paper focuses on business cycles co-movements across main euro zone economies. The degree of synchronization of each European economy with one another is evaluated through a measure of dynamic correlation estimated in a time-varying framework. The study accounts for the effects of the monetary unification on business cycle convergence. Country-specific cycle components, net of the Eurozone common business cycle, are obtained using a methodology based on the multivariate generalized Butterwoth filter. The similarity of the cyclical structures is evaluated through the Euclidean metric between full and specific dynamic correlations at business cycle frequencies. Consistent with the recent literature, a significant share of the relative comovements across European economies is prior to the establishment of the Monetary Union.

Gamma Approximation Cointegration (GAC). Documentation and User Manual

Abstract. There are large size distortions in tests of both the cointegrating rank and restrictions on the cointegrating space. Gac is an Ox program that corrects
the test results by applying Bootstrap and simulations techniques. The name of
the program, gac, refers to that the distribution of both the cointegrating rank test
and the cointegrating restriction test seems to have a distribution that can be
approximated by a Gamma-distribution and that one of the test-corrections in gac
make use of this distribution. gac utilize the OxPack interface in Ox, and is
therefore menu driven and easy to use.