

Saturday, 21/04/2007

17:20-19:25

Parallel Session G

SN20 Room: MR380 SIGNAL EXTRACTION AND FILTERING - 4

Chair: Stephen Pollock

**#5: Stochastic volatility models and the Taylor effect***Presenter:* ..... Esther Ruiz@Universidad Carlos III de Madrid, Spain*Co-authors:* ..... Alberto Mora-Galan, Ana Perez

It is often observed that the autocorrelations of powers of absolute financial returns are larger when the power parameter is close to one. In this paper, we show that the ARSV(1) is able to explain this property, known as Taylor effect, for the parameter values often encountered in the analysis of real time series of financial returns. Only when the kurtosis of returns are very close to 3 the autocorrelations are maximized for squares while when the kurtosis is too large, they are maximized for values of the power parameters smaller than one. We also show that the Taylor effect cannot be attributed to sampling biases when estimating the sample autocorrelations. We consider the order  $k$  autocorrelations of powers of absolute returns as a function of the power parameter and show that they are maximized at the same value of this parameter regardless of whether we look at the sample or model based autocorrelations. Consequently, we propose to use as a diagnostic for the adequacy of an estimated ARSV model, the discrepancy between the sample and plug-in power parameters that maximized the autocorrelations. All the results are illustrated in several real series of financial returns.

**#96: Online analysis of time series by the Qn estimator***Presenter:* ..... Robin Nunkesser@University of Dortmund, Germany*Co-authors:* ..... Karen Schettlinger, Roland Fried, Ursula Gather

We investigate statistical online monitoring of noisy time series which are measured with high sampling frequencies. The aim is to extract the time-varying level underlying the time series (the signal) and to detect relevant changes in it. The task of online signal extraction is often rendered difficult by measurement problems or unusual events leading to atypical observations, and by the need for automatic monitoring in real time. Accordingly we prefer robust methods which however can be computationally too demanding for online application if efficient algorithms are not available. The  $Q_n$  is a robust scale estimator which possesses a breakdown point of 50 percent, i.e. the effect of less than 50 percent outliers is bounded. Additionally, the Gaussian efficiency of the  $Q_n$  estimator is 82 percent in large samples, which is much higher than for most other robust scale estimators such as e.g. the median absolute deviation (MAD). We find the  $Q_n$  to be highly useful for robust time series analysis. Firstly, we can apply it for estimation of the autocorrelation at lag  $h$  from the sums and the differences of subsequent observations lagged by  $h$  time points. Secondly, the high efficiency of the  $Q_n$  increases the power of tests for level shift detection which apply a robust scale estimator for standardization. The  $Q_n$  can even be used twice in this context since the thresholds for the standardized test statistic should be chosen depending on the (estimated) autocorrelations in the time series. We consider the online application of  $Q_n$  to time series data and show its good performance via simulations. We present a fast online algorithm which can also be used to compute the Hodges-Lehmann location estimator online. The algorithm is easy to implement and improves the online applicability of these estimators.

**#103: Real-time signal extraction: a generalized error criterion emphasizing turning points***Presenter:* ..... Marc Wildi@ZHW, Switzerland

Signal extraction is concerned with the definition and the estimation of interesting components of a time series. Real-time signal extraction focuses on the practically relevant concurrent signal estimates which convey a strong prospective content: so for example an early assessment of 'turning points' is likely to be informative about the future evolution of a system. Unfortunately, traditional model-based approaches (such as ARIMA) are subject to methodological weaknesses because their optimization criteria do not match the relevant estimation problem. As a consequence, ARIMA-models perform poorly in the vicinity of turning points, as is well known in practice. Therefore, the paper proposes a new method which emphasizes specifically turning point issues. More precisely, it is shown that the new optimization criterion generalizes the ordinary mean-square error criterion by emphasizing mean-square performances of the resulting causal filter in the vicinity of turning points (at costs of the remaining time points). Of course, in order to be useful this selective regard on the time axis is obtained without requiring a priori knowledge of the location of turning-points.

**#141: Testing for Granger causality in the frequency domain***Presenter:* ..... Christophe Croux@K.U.Leuven, Belgium*Co-authors:* ..... Aurelie Lemmens, Dekimpe Marnik

A series is said to Granger cause another series if it has incremental predictive power when forecasting it. The strength of the Granger causality can be decomposed over the time domain, but also over the frequency domain. A spectral approach to Granger causality has the distinct advantage that it allows to disentangle (potentially) different Granger-causality relationships over different frequencies. We study a bivariate spectral Granger-causality test, originally proposed by Pierce, that can be applied at each individual frequency of the spectrum. We compare this testing procedure to existing Granger causality tests, in the time and in the frequency domain, and study their power by means of Monte Carlo simulations. We also apply this test to investigate the predictive value of the European production expectation surveys. Our results indicate that the predictive content of these surveys varies along the frequency band.