## An application of the generalised JLS model on different stock market indices and the 2007–2008 financial crisis

ŠPELA JEZERNIK ŠIRCA

*Xlab*
*Ljubljana (Slovenia)*
`spela.jezernik@gmail.com`

Sornette and co-workers proposed that, prior to crashes, the stock index price time series is characterised by the Log-Periodic Power Law (LPPL) equation of the Johansen–Ledoit–Sornette (JLS) model. In this paper, we use a Differential Evolution algorithm for global optimisation of the highly nonlinear JLS model. We analyse the JLS model's residuals and propose an ARMA/GARCH error model to capture the residuals' behaviour. Furthermore, we use the extended autocorrelation function (EACF) method for an order determination of the ARMA/GARCH model and compare these results with those of the Akaike and Bayesian Information Criteria. The original JLS model and its generalisation are applied to the well-documented crash of October 1987 of the indices S&P 500 and Dow Jones Industrial Average, and to the DAX index prior to the crash of 1998. We also provide empirical results to show that these models could have been used to predict the 2007–2008 financial crisis. Moreover, we show that our generalised JLS model improves the statistical properties of the model residuals.

This is a joint work with M. OMLADIČ (University of Ljubljana).