REGIME-SWITCHING MODELLING OF GLOBALIZATION ANALYSIS IN INTERNATIONAL STOCK MARKETS

Nuno B. Ferreira[a], **Rui Menezes** and **Diana A. Mendes**
nuno.ferreira@iscte.pt; rui.menezes@iscte.pt; diana.mendes@iscte.pt
[a] corresponding author

Department of Quantitative Methods, ISCTE
Av. Forças Armadas, 1649-026 Lisbon, PORTUGAL

The internationalization of financial markets is one of the topics in the discussion about recent globalization trends. Other events such as the stock market crashes and financial crises also make the study of the globalization within international stock markets an important topic for financial policy makers. There is no doubt that globalization and its effects are one of the most serious and disputed problems of our days.

Several experimental research showed that stock markets display periods of marked turbulence and exhibit extreme values more often than one would expect if the series were normally distributed (fat tail property). In this context, in order to better understand this phenomenon, it was developed, between others, the Markov Switching Model (MSM).

Nowadays, this kind of models has attached much attention in financial and economic modeling, since, ample empirical evidence has been gathered for both nonlinearity and structural changes in the dynamic properties of many observed time series.

In particular, the dynamic behaviour of macroeconomic time series depends nonlinearly on the phase of the business cycle. This regime-switching behaviour related to expansion and contraction periods has been the focus of much research [see [1], [2], [3], [4]].

The model presented in [1] was based on a smooth transition autoregressive (STAR) model in order to investigate cyclical behaviour of stock returns in the G7. The estimated models suggest that stock price behaviour is characterised by asymmetric cycles with relatively slow rates of transition between regimes and out-of-sample forecasts from the models outperform a random walk.

Due to the presence of asymmetric effects in the mean and in the time varying conditional variance, the complex behaviour of financial time series can be hardly captured by linear models. The last two decades have been characterised by a growing interest in the application of non linear time series modelling techniques to the analysis of financial data. Attention has been mainly paid to modelling the conditional variance. However a point which needs to be stressed it is that an adequate modelling of the nonlinear dependence in the conditional mean is necessary in order to avoid misspecification of the conditional variance model. In this framework, [5] first proposed to combine the use of a non-linear model for the conditional mean with a nonlinear model for the conditional variance. This idea was successively adopted in different contexts by various authors. Among them [6] developed the identification and estimation strategy of the SETAR-ARCH model that allows to simultaneously capture asymmetric effects in the conditional mean together with a changing conditional variance.

We focus our analysis to study mainly the effect of globalization on five international stock

markets: (SP&500; FTSE100; NIKKEI100; IBEX35 and PSI20) based on daily closing stock market prices, from 4 January 1999 until 30 of September 2008, employing a smooth transition regression (STAR) model. The results clearly show that the stock markets are characterized by the presence of nonlinear patterns.

Keywords
Stock markets, globalization, smooth transition autoregressive models, nonlinearity

References

[1] Sarantis, ``Nonlinearities, cyclical behaviour and predictability in stock markets: international evidence", *Journal of Forecasting*, 17, p. 459-482, 2001.
[2] T. Teräsvirta and H. M. Anderson, ``Characterizing nonlinearities in business cycles using smooth transition autoregressive models, " *Journal of Applied Econometrics*, 7, S119-S136, 1992.
[3] S. Potter ``A Nonlinear Approach to US GNP," *Journal of Applied Econometrics*, 1995.
[4] M. Pesaran and S. Potter, ``A Floor and Ceiling Model of US Output", *Journal of Economic Dynamics and Control*, 21, p. 661-695, 1997.
[5] Tong, ``Non-linear time series: A dynamical system approach, " *Oxford University Press, Oxford*, 1990.
[6] W.K. Li and K. Lam, `` Modelling the asymmetry in stock returns by a threshold ARCH model", *Statistician*, 44, p. 333-341, 1995.