Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Subject
Methods of analysis and forecasting of non-linear time series – applications in financial market

Supervisors, contact, place of research
dr hab. Leszek Klukowski (Leszek.Klukowski@ibspan.waw.pl, tel. 692452770), IBS PAN, Newelska 6, 01-447 Warsaw

Project Description

Analysis and forecasting of data in the form of time series are applied in many fields of market finance. They are often the basis for optimal decision making. The models of financial time series are typically non-linear, because of their complex nature [2, 3]. Construction of time series model comprises three main stages: identification of class of the model, estimation of parameters, verification of obtained model – ex ante and ex post. Each of the stage is based on appropriate statistical tools – estimators and tests. The purpose of application of these tools is to determine adequate form of the model, with optimal properties of forecasts, i.e. minimizing forecasting error. Complexity of financial phenomena indicates that construction of optimal models is not easy problem. Very often it requires developing of new form of models and appropriate statistical tools and comparison with alternative approaches, e.g. artificial neural networks. The last tool is considered as universal and efficient in broad class of phenomena. However, their ability to forecast some type of nonlinearity, especially regime switching models, is lower than the switching models.

Analysis and forecasting of financial time series requires some knowledge in the area: basic time series methods based on stochastic processes [1, 2] and financial engineering [3]. Some knowledge of statistics including simulation methods and mathematical programming methods is also necessary.

Bibliography

1. D.C Montgomery, Ch.L. Jennings, M. Kulahci: Introduction to Time Series Analysis and Forecasting, J. Wiley, Hoboken New Jersey 2008.
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3. Weron A., Weron R.: Inżynieria finansowa. Wycena instrumentów pochodnych, Symulacje komputerowe, Statystyka rynku. WNT, Warszawa, 1998.

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