

Abstract

The objective of this research is to compare the estimation of the NonLinear Autoregressive (NLAR) model and Conditional Heteroscedastic Nonlinear Autoregressive (CHNLAR) model with Smoothing Spline (SS) and Penalized Spline (PS) methods in a class of nonparametric regression method. NLAR model consists of a response variable and a function of predictor variable as a past of response variable. CHNLAR model consists of the function of trend and heteroscedastic (volatility) as a past of response variable at lag 1. Moreover, the nonparametric regression method has been developed the smoothing technique which produces a smoother based on NLAR and CHNLAR model. The SS and PS methods are computed to fit NLAR and CHNLAR model with stationary and nonstationary time series data.

For simulation study of NLAR model, the data is generated by the autoregressive process with several coefficient autocorrelations and sample sizes. The performance of SS and PS methods is used the criterion by minimizing the average Mean Square Error (MSE) values. The SS method exhibits a good power estimation in all cases of stationary and nonstationary data. For economic data, the gold price is an important factor for pretty much all of the world market. The gold price (US Dollars per Troy Ounce) is then applied by using SS and PS methods that collected in term of the monthly volume from January, 1984 to December 2013. The result is founded that the SS method performs better than PS method which is similar the result in case of simulation study.

For simulation study of CHNLAR model, the data is simulated by the trend and heteroscedastic functions. The performance of SS and PS methods is used the hypothesis testing by the bias of the trend and heteroscedastic estimators. The SS and PS methods exhibit a good power estimation in most cases of generated data. For real data, the gold price (US Dollars per Troy Ounce) is then applied by using SS and PS methods. The results show that the SS method performs similar the PS method which is similar the result in case of simulation study.

Keywords: Conditional Heteroscedastic Nonlinear Autoregressive model, NonLinear Autoregressive model; Smoothing Spline Method; Penalized Spline Method.