UNIVERSITI TEKNOLOGI MARA

DEVELOPMENT OF TEST STATISTIC FOR DETECTING OUTLIERS IN GARCH(1,1) PROCESSES

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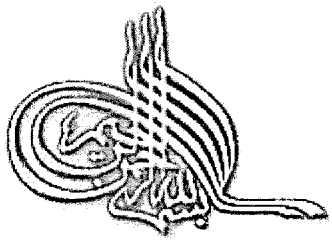
ABSTRACT

This study is about outlier detection in time series data. The main objective is to derive and to test statistics for detecting outliers in GARCH(1,1) processes and subsequently to develop a procedure for testing the presence of outliers using the statistics. Types of outliers for which the statistics were derived are additive outlier (AO), innovative outlier (IO), level change outlier (LC) and temporary change outlier (TC). A test statistic has been derived for each type of outlier. In the derivation of the statistics, the method applied was to derive outlier detection statistics for GARCH(1,1) by taking the analogy of GARCH(1,1) as being equivalent to ARMA(1,1) for the ε_t^2 (ε_t being the residual series). Because of the difficulty in determining the exact sampling distributions of the outlier detecting statistics, critical regions were estimated through simulations. The performance of the outlier detection was evaluated based on the outlier test criteria and the outlier detection procedure, using simulations. Results on the power of correctly detecting the outlier using the outlier test criteria and the power of correctly identifying the type of outlier, given that the location is correctly detected were reported. This was done for each type of outlier, individually. In this study the developed outlier detection procedure was applied for testing the presence of the four outlier types in the daily observations of the Kuala Lumpur Composite Index (KLCI), the Index of Consumer Product (ICP), and the Index of Industrial Product (IIP). All of these data sets were converted to returns series to make them stationary. The results showed that type TC outlier was present in the returns of KLCI and ICP while outlier of type AO was present in the returns of IIP. In general, most of the identified outliers in the three data series were of AO and TC types. The outliers for all the three data series were found to be present in year 1998 which corresponded to the economic downturns of the 1997-1998 period.

ACKNOWLEDGEMENTS



IN THE NAME OF ALLAH

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