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Estimating stock market volatility using asymmetric GARCH models

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Abstract

A comprehensive empirical analysis of the mean return and conditional variance of Tel Aviv Stock Exchange (TASE) indices is performed using various GARCH models. The prediction performance of these conditional changing variance models is compared to newer asymmetric GJR and APARCH models. We also quantify the day-of-the-week effect and the leverage effect and test for asymmetric volatility. Our results show that the asymmetric GARCH model with fat-tailed densities improves overall estimation for measuring conditional variance. The EGARCH model using a skewed Student-t distribution is the most successful for forecasting TASE indices.

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Notes

[1] The TA25 Index is a value-weighted index of the shares of the 25 companies with the highest market capitalization that are traded on the TASE.

[2] The TA100 Index is a value-weighted index of the shares of the 100 companies with the highest market capitalization that are traded on the TASE.

[3] The BFGS method approximates the Hessian matrix by analyzing successive gradients vectors.

[4] The estimated values for the four models are available from the authors.

[5] The Prob[1] and Prob[2] are the probability values for P(50), the first using 49 degrees of freedom and the second 49 minus the number of estimated parameters.

[6] MSE and MAE are generally affected by larger errors such as in the case of outliers. MedSE and AMAPE have the advantage of reducing the effect of outliers.

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