

Uji Volatilitas dan Prediksi Return Harga *Crude Oil* dengan Implementasi Metode ARCH - GARCH dan *Fuzzy Time Series*

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Abstrak

Prediksi harga merupakan salah satu aspek utama dalam bidang finansial berbasis saham. Tujuannya adalah meminimalisir terjadinya risiko dan membantu investor dalam pengambilan keputusan untuk portofolio. Penulisan ini menggunakan metode ARCH-GARCH dalam memodelkan *return* saham minyak mentah selama periode 19 September 2005 hingga 30 April 2016. Perhitungan harga saham terhadap *log return* dengan model ARCH-GARCH. Residual yang diperoleh dari model ARCH-GARCH diuji *heteroskedasticity* dengan uji Lagrange Multiplier (LM). Model ARCH-GARCH terbaik dipilih berdasarkan nilai BIC dan Akaike terkecil, dengan uji BIC dan Akaike didapatkan model GARCH(1,1) lah yang terbaik untuk dijadikan model prediksi data harga komoditi minyak mentah. Berikutnya, digunakan algoritma *Fuzzy Time Series* (Chen, 1996). *Fuzzy Time Series* model Chen adalah model peramalan *Fuzzy Time Series* yang menentukan panjang interval dengan metode berbasis rata-rata atau *average-based fuzzy time series*, sehingga pembentukan FLR dan FLRG akan tepat dan menghasilkan hasil prediksi yang signifikan. Hasil dari analisis peramalan ARIMA-GARCH terdapat tiga asumsi yang harus dipenuhi, yaitu terpenuhinya asumsi tidak ada autokorelasi, asumsi normalitas dan asumsi homoskedastisitas. Model prediksi Fuzzy Time Series ini memiliki nilai MSE sebesar 16.035 dan RMSE 12.670, sedangkan pada ARCH-GARCH ini didapatkan nilai MSE sebesar 4.668 dan RMSE sebesar 6.832.

Kata kunci : ARCH-GARCH, *Fuzzy Time Series*, saham, volatilitas, prediksi, model Chen

Abstract

Price prediction is one of the main aspects of the field of stock-based finance. The aim is to minimize the occurrence of the risk and assist investors in making decisions for their portfolio. This writing uses ARCH-GARCH and Fuzzy Time Series method for modelling the return of crude oil stocks during the period 19 September 2005 to 30 April 2016. Calculation of stock returns against log return with the ARCH-GARCH model. Residuals obtained from the ARCH-GARCH model were tested for heteroskedasticity with the Lagrange Multiplier (LM) test. The best ARCH-GARCH model was chosen based on the smallest BIC and Akaike values, with the BIC and Akaike tests it was found that the GARCH (1,1) is the best model to be used as a prediction model for the price of this crude oil commodity. Next, use Chen's Fuzzy Time Series algorithm. The Chen model is a Fuzzy Time Series forecasting model that determines the length of the interval with the average-based method or average-based fuzzy time series so that the formation of FLR and FLRG will be precise and produce significant predictive results. The results of ARIMA-GARCH forecasting analysis, three assumptions must be met, namely the non-autocorrelation assumptions, normality assumption and homoscedasticity assumptions are met. Predictive model using Fuzzy Time Series shows the MSE error value obtained at 16.035 and RMSE 12.670, while ARCH-GARCH shows the MSE error value obtained at 4.668 and RMSE 6.832.

Keywords: ARCH-GARCH, *Fuzzy Time Series*, stock, volatility, prediction, Chen model
