

ABSTRAK

Harga emas merupakan salah satu instrumen investasi yang memiliki pergerakan harga yang fluktuatif sehingga diperlukan metode prediksi yang mampu menangkap pola non-linear dan karakteristik volatilitas data deret waktu. Penelitian ini bertujuan untuk memprediksi harga emas dalam denominasi Rupiah (GAU/IDR) menggunakan model hybrid *Long Short-Term Memory* (LSTM) dan *Generalized Autoregressive Conditional Heteroskedasticity* (GARCH). Model LSTM digunakan untuk memprediksi harga emas, sedangkan model GARCH digunakan untuk memodelkan volatilitas residual hasil prediksi LSTM. Data yang digunakan berupa data historis harga emas harian periode 18 September 2020 hingga 15 Juni 2026 yang diperoleh dari Investing.com. Tahapan penelitian meliputi pra-pemrosesan data, pembagian data latih dan data uji berdasarkan periode waktu, pemodelan LSTM, pemodelan GARCH, serta evaluasi menggunakan *Root Mean Squared Error* (RMSE) dan *Mean Absolute Percentage Error* (MAPE).

Hasil penelitian menunjukkan bahwa model terbaik menghasilkan nilai RMSE sebesar 58.997,19 dan MAPE sebesar 2,33%, yang menunjukkan bahwa model memiliki tingkat akurasi yang sangat baik. Selain itu, model digunakan untuk melakukan *forecasting* harga emas selama tujuh hari ke depan, yaitu periode 16 Juni 2026 hingga 22 Juni 2026. Hasil *forecasting* menunjukkan bahwa harga emas diprediksi meningkat dari Rp2.482.105 menjadi Rp2.636.730. Model GARCH juga berhasil memberikan estimasi volatilitas sebagai indikator risiko pergerakan harga emas. Penelitian ini menunjukkan bahwa model *hybrid* LSTM-GARCH mampu menghasilkan prediksi harga emas yang akurat serta memberikan informasi volatilitas yang dapat mendukung pengambilan keputusan investasi.

Kata kunci: Prediksi Harga Emas, GAU/IDR, LSTM, GARCH, Model *Hybrid*

ABSTRACT

Gold is an important investment instrument whose price movements are highly volatile. Therefore, a forecasting method capable of capturing non-linear patterns and volatility characteristics in time-series data is required. This study aimed to predict gold prices in Indonesian Rupiah (GAU/IDR) using a hybrid Long Short-Term Memory (LSTM) and Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. The LSTM model was used to forecast gold prices, while the GARCH model was applied to the residuals of the LSTM predictions to model volatility. The dataset consisted of daily historical gold price data from September 18, 2020, to June 15, 2026, obtained from Investing.com. The research process included data preprocessing, time-based training and testing data splitting, LSTM modeling, GARCH modeling, and model evaluation using Root Mean Squared Error (RMSE) and Mean Absolute Percentage Error (MAPE).

The results showed that the best model achieved an RMSE of 58,997.19 and a MAPE of 2.33%, indicating a very high forecasting accuracy. Furthermore, the model was used to forecast gold prices for the next seven days, from June 16, 2026, to June 22, 2026. The forecasting results indicated an increase in gold prices from IDR 2,482,105 to IDR 2,636,730. The GARCH model also provided volatility estimates that could be used as indicators of risk and uncertainty in future price movements. The findings suggest that the hybrid LSTM-GARCH model is capable of generating accurate gold price forecasts while simultaneously providing volatility information that can support investment decision-making.

Keywords: *Gold Price Prediction, GAU/IDR, LSTM, GARCH, Hybrid Model.*