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Forecasting Volatility: A Comparative Study of GARCH and Implied Volatility Using the NOK/SEK Exchange Rate

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Abstract

Volatility forecasting is an integral task in finance, with strong implications for option pricing, risk management, and investment strategies. Two commonly used methods for volatility forecasting include the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model, a traditional statistical approach, and Implied Volatility derived from option prices, which very much reflect the market's expectations of future volatility.

This thesis presents a comparison of the performance of the standard GARCH(1,1) model and Implied Volatility when forecasting the volatility of the NOK/SEK exchange rate, using Naive forecasts as a reference point. The study examines the Mean Squared Error (MSE) of the forecasts produced by both methods, and evaluates their accuracy when compared to the true realised volatility. The study relies on data from mid-2013 to mid-2023 obtained from Yahoo Finance and Eikon.

The results indicate that overall, the GARCH(1,1) model generates more accurate forecasts than Implied Volatility, as measured by the MSE. However, the superiority of the GARCH model is not universal, with Implied Volatility outperforming in certain years. Noteworthy, there is a strong correlation between the performance of GARCH and Implied Volatility, with both methods experiencing difficulties in years of high volatility. Additionally, the Naive forecasts offer relatively accurate forecasts, even performing the best of all methods in 2014. The findings support previous research suggesting the complex nature of volatility prediction, with no one-size-fits-all solution.

The study identifies research gaps, particularly in comparing GARCH and Implied Volatility in the context of exchange rates, and suggests promising avenues for future research. The findings of this thesis contribute to the theoretical understanding of volatility forecasting, and offer practical insights for market participants.

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