

## Title

# Volatility Forecasting using Hybrid GARCH Neural Network Models: The case of the Italian Stock Market

## Abstract

In several financial applications, it is extremely useful to predict volatility with the highest precision. Neural Networks alongside GARCH-type models have been extensively employed in the last decades for estimating volatility of financial indices. The motivation of this survey is to decide whether combining different types of models can improve the return volatility forecasts. Thus, two hybrid models are utilized and compared with an asymmetric GARCH model and a Neural Network in terms of their ability to predict the volatility of the FTSE MIB index. The conclusions reveal that the hybrid model, which is based on a Neural Network having as inputs the returns and its historical values as well as the estimates of conditional volatility obtained by an EGARCH model, provides the best predictive power. Moreover, the dominance of this hybrid model is such that it forecast encompasses the remaining models. Finally, it is demonstrated that there are significant leverage effects in the Italian stock market.

**Keywords:** Artificial Neural Network; Forecast Encompassing; GARCH Models; Realized volatility; Stock Market; Volatility Forecast

**JEL Classifications:** C22; C45; C53; G15

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