

UNIVERSITY OF NAIROBI

COLLEGE OF BIOLOGICAL & PHYSICAL SCIENCES

**SCHOOL OF MATHEMATICS
DEPARTMENT OF ACTUARIAL SCIENCE & FINANCIAL
MATHEMATICS**

**MODELLING VOLATILITY OF THE
STOCK INDEX:
AN ANALYSIS OF STANDARD & POORS
500 INDEX**

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Abstract

The volatility clustering often seen in financial data has increased the interest of researchers in applying good and relevant models to measure and forecast stock returns. This study aims to model and forecast the volatility for daily and weekly returns of the S&P 500 Index, ranging from 1/2/1970 for daily return series and 1/5/1970 for weekly returns series up to 9/21/2009, thus giving a total of 10,026 and 2,072 observations for daily and weekly return series respectively. The study also addresses the issues of volatility persistence, leverage effects and the risk premium in the stock market using the Generalized Autoregressive Conditional Heteroskedasticity GARCH (1, 1), Generalized Autoregressive Conditional Heteroskedasticity GARCH (1, 1) –in-Mean, Exponential GARCH (1, 1) and the Threshold GARCH models. In the study, we find support that there are significant asymmetric shocks to volatility in the daily stock returns more than the weekly returns. We also find that the persistence in conditional volatility is different in daily and weekly returns due to time frequency and not due methodology in application. Further, we find that the return series data however stationary is not generated from a normal distribution process as demonstrated in the study using the Jarque-Bera technology, but from a non-normal distribution as shown in all cases of the presence of skewness and tail thickness in the conditional distribution of returns. Finally, we compare the forecasting performance of the various volatility models in the out-of-sample framework and consider the dynamic forecasts across the framework to assess the performance.