

## Extreme Value Modelling of Ghana Stock Exchange Indices

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**Abstract :** Modelling of extreme events has always been of interest in fields such as hydrology and meteorology. However, after the recent global financial crises, appropriate models for modelling of such rare events leading to these crises have become quite essential in the finance and risk management fields. This paper models the extreme values of the Ghana Stock Exchange All-Shares indices (2000-2010) by applying the Extreme Value Theory to fit a model to the tails of the daily stock returns data. A conditional approach of the EVT was preferred and hence an ARMA-GARCH model was fitted to the data to correct for the effects of autocorrelation and conditional heteroscedastic terms present in the returns series, before EVT method was applied. The Peak Over Threshold (POT) approach of the EVT, which fits a Generalized Pareto Distribution (GPD) model to excesses above a certain selected threshold, was employed. Maximum likelihood estimates of the model parameters were obtained and the model's goodness of fit was assessed graphically using Q-Q, P-P and density plots. The findings indicate that the GPD provides an adequate fit to the data of excesses. The size of the extreme daily Ghanaian stock market movements were then computed using the Value at Risk (VaR) and Expected Shortfall (ES) risk measures at some high quantiles, based on the fitted GPD model.

**Keywords :** extreme value theory, expected shortfall, generalized pareto distribution, peak over threshold, value at risk

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