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A CONCEPTUAL FRAMEWORK OF GARCH MODELS FOR ESTIMATING VOLATILITY OF THE ASSETS

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The GARCH model additionally assumes that forecasts of variance changing in time also depend on the lagged conditional variances of capital assets. An unexpected increase or fall in the returns of an asset at time *t* will generate an increase in the variability expected in the period to come. GARCH models are designed to capture certain characteristics that are commonly associated with financial time series: fat tails, volatility clustering and leverage effects. This study covered GARCH models for estimating & forecasting volatility in Financial Assets.

INTRODUCTION

GARCH is known as Generalized Auto Regressive Conditional Heteroskedasticity. It is a model of errors and mostly used in other models to represent volatility. The models that make use of GARCH vary from predicting the spread of toxic gases in the atmosphere to simulating neural activity and finance is the leading area and dominates the research on GARCH. ARCH class models were first introduced by Nobel Prize awarded Engle (1982), with the ARCH model. Since then, numerous extensions have been put forward, all of them modeling the conditional variance as a function of past (squared) returns and associated characteristics.

GARCH models are designed to capture certain characteristics that are commonly associated with financial time series: fat tails, volatility clustering and leverage effects. Probability distributions for assets returns often exhibit fatter tails than the standard normal, or Gaussian, distribution. Time series a very important dimension that exhibit a fat tail distribution js often referred to as leptokurtic. In addition, financial time series usually exhibit a feature known as volatility clustering, in which large changes tend to follow large changes, and small changes tend to follow small changes. In either case, the changes from one period to the next period are typically of unpredictable sign. Large disturbances, positive or negative, become part of the information set used to construct the variance forecast of the next period's disturbance. In this manner, large shocks of either sign are allowed to persist, and can influence the volatility forecasts for several periods. Volatility clustering, or persistence, suggests a time-series model in which successive disturbances, although uncorrelated, are nonetheless serially dependent.

Finally, certain classes of asymmetric GARCH models are also capable of capturing the so-called leverage effect, in which asset returns are often observed to be negatively correlated with changes in volatility. A standard approach of time series analysis is to take a time series that exhibits complicated behavior and try to convert it to a simpler form. Optimally, such simplification would yield time series that were so easy &simple that they could reasonably be modeled as independent and identically distributed (IID). In practice, and especially in financial applications, this is rarely possible. Stationarity is a condition similar to IID, but not as strong. Two different forms of stationarity are defined:

i) A process is said to be **strictly stationary** if the unconditional joint distribution of any segment (yt, $yt+1$, ...,$yt+r$) is identical to the unconditional joint distribution of any other segment ($yt+s$, $yt+s+1$, ..., $yt+s+r$) of the same length.

ii) A process is said to be **covariance stationary** if the unconditional joint distribution of any segment (yt, $yt+1$, ..., $yt+r$) has means, standard deviations and correlations that are identical to the corresponding means, standard deviations and correlations of the unconditional joint distribution of any other segment ($yt+s$, $yt+s+1$, ..., $yt+s+r$) of equal length. Correlations include autocorrelations and cross correlations. Strict stationarity is appealing because it affords a form of homogeneity across terms without requiring that they be independent. Covariance stationarity is the condition that is more frequently assumed in