# Bayesian Estimation of the parameters of the COGARCH(1,1) Model using Lindley's Approximation

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**ABSTRACT**

In ordinary discrete GARCH models, time series are assumed to be equally spaced. But, time series have often irregular space between two observations. To accommodate the irregularity of time spaces, Klüppelberg et al. (2004) proposed a continuous time GARCH (COGARCH) process driven by a Lévy process. Maller et al. (2008) used an approximation to fit the model to unequally spaced time data, by deriving a pseudo-maximum likelihood (PML) function and numerically maximizing it in order to estimate the corresponding parameters. In this way, given a COGARCH model, there exists a sequence of GARCH models which converge to COGARCH. The parameters are treated as unknown constants in PML method. In Bayesian analysis, the parameters are treated as random variables with known probability functions, known as the prior distributions. In this study, it is assumed that the parameters of COGARCH (1,1) are random variables having a known probability density function and therefore will be estimated using Bayesian Methods. Lindley's approximation will be used to estimate the unknown parameters. Bayesian estimates are derived under squared error loss function (SELF). Simulation study will be applied to compare the parameters estimated by PML method with Bayesian Inference method under SELF. The corresponding error variances between PMLEs and real values, Bayes estimates and real values will be compared.

**Keywords: COGARCH, PML method, Lindley's Approximation, Bayesian Methods, SELF**