

## An Empirical Study of the Best Fitting Probability Distributions for Stock Returns Modeling

**Authors :** Jayanta Pokharel, Gokarna Aryal, Netra Kanaal, Chris Tsokos

**Abstract :** Investment in stocks and shares aims to seek potential gains while weighing the risk of future needs, such as retirement, children's education etc. Analysis of the behavior of the stock market returns and making prediction is important for investors to mitigate risk on investment. Historically, the normal variance models have been used to describe the behavior of stock market returns. However, the returns of the financial assets are actually skewed with higher kurtosis, heavier tails, and a higher center than the normal distribution. The Laplace distribution and its family are natural candidates for modeling stock returns. The Variance-Gamma (VG) distribution is the most sought-after distributions for modeling asset returns and has been extensively discussed in financial literatures. In this paper, it explore the other Laplace family, such as Asymmetric Laplace, Skewed Laplace, Kumaraswamy Laplace (KS) together with Variance-Gamma to model the weekly returns of the S&P 500 Index and it's eleven business sector indices. The method of maximum likelihood is employed to estimate the parameters of the distributions and our empirical inquiry shows that the Kumaraswamy Laplace distribution performs much better for stock returns modeling among the choice of distributions used in this study and in practice, KS can be used as a strong alternative to VG distribution.

**Keywords :** stock returns, variance-gamma, kumaraswamy laplace, maximum likelihood

**Conference Title :** ICMDSI 2023 : International Conference on Materials Data Sciences and Informatics

**Conference Location :** New York, United States

**Conference Dates :** December 11-12, 2023