An Application of Wavelet Based Density Estimation in S&P SL20 Index of Colombo Stock Exchange (CSE)

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This study focuses on applications of wavelet based methods in estimating probability density functions (PDF) for returns and log returns of a daily recorded data set of S&P SL20 index of Colombo Stock Exchange (CSE). The density of returns and log returns play an important role summarizing the stock market behavior in CSE. The use of nonparametric methods for such estimations are more popular since they provide more flexible platform to describe PDF representing important features like skewness, peaks and fat tails. The wavelet theory in reconstructing functions has become a powerful structure in various fields. Therefore, wavelet based density estimation methods can be applied as a novel nonparametric approach in stock market indices to obtain probability density functions. In this study, wavelet theory of constructing PDF is used for returns and log returns of S&P SL20 during the period from June 28, 2012 to March 31, 2017. To reduce the computational complexity, Haar wavelets are used with appropriate but low resolution levels. Appropriate resolution levels means levels that give almost successful approximations. After constructing wavelet based densities, their smoothed curves are plotted using MATLAB to observe the shape of density functions. The results show that the wavelet based estimations are well suited for this particular data when the resolutions were used up to level 9. Moreover, it seems that the curves illustrate more details than normal distribution fittings. The goodness of fit test is used to verify the validity of estimations with relative frequencies at 5% significance level. The work justified the applicability of a wavelet based method for estimating probability density distributions, particularly for such data samples in stock market indices.

Key words: *stock market indices, probability density estimation, wavelets*

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