

**Direct Nonparametric Conditional Quantile and Scale Regression Estimation, with  
Application to Financial Time Series Data**

**Benjamin Kyalo Muema**

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## ABSTRACT

We consider a nonparametric approach in estimation of conditional quantile and scale functions for financial time series at both interior and boundary points. The estimation combines local linear approximation and the quantile regression methodology introduced by Koenker and Basset [27]. In particular, we have suggested two estimators, a direct non-parametric local linear estimator of the conditional quantile function vis-à-vis direct nonparametric local linear estimator of the conditional scale function. The two estimators are estimated under a quantile-scale model set up where the latter is estimated under the assumption that the former is unknown and it has to be estimated first. Consistency and asymptotic properties are investigated and were found to be good at interior and at boundary points. Finally, we have subjected the estimators to simulated and the results support the theoretical results already established for the proposed estimators.