Mathematical Sciences
The University of Texas at El Paso

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Autoregressive Conditional Duration Model with an Extended Weibull Error Distribution

Trade duration and daily range data often exhibit asymmetric shape with long right tail. In analysing the dynamics of these positively valued time series under autoregressive conditional duration (ACD) models, the choice of the conditional distribution for innovations has posed challenges. A suitably chosen distribution, which is capable of capturing unique characteristics inherent in these data, particularly the heavy tailedness, is proved to be very useful. This paper introduces a new extension to the class of Weibull distributions, which is shown to perform better than the existing Weibull distribution in ACD and CARR modelling. By incorporating an additional shape parameter, the Weibull distribution is extended to the extended Weibull (EW) distribution to enhance its flexibility in the tails. An MCMC based sampling scheme under a Bayesian framework is employed for statistical inference and its performance is demonstrated in a simulation experiment. Empirical application is based on trade duration and daily range data from the Australian Securities Exchange (ASX). The performance of EW distribution, in terms of model fit, is assessed in comparison to two other frequently used error distributions, the exponential and Weibull distributions.