

Robust quasi-likelihood estimation for the negative binomial integer-valued GARCH(1,1) model with an application to transaction counts

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Abstract

For count time series analysis, the Poisson integer-valued generalized autoregressive conditional heteroscedastic model is very popular but is not usually suitable in the existence of potential extreme observations. Maximum likelihood estimator is commonly used to estimate parameters, but it is highly affected by the outliers. This paper has three main aims. First, we apply the negative binomial model in our study for count time series analysis and consider the maximum likelihood estimation of this model. Second, we extend the Mallows' quasi-likelihood method proposed in the generalized linear models to our situation. Besides, we establish the consistency and asymptotic normality for the resulting robust estimators under some regularity conditions. Third, the performances of these robust estimators in the presence of transient shifts and additive outliers are investigated via simulations. We apply the robust estimator to two stock-market data sets and their prediction performances are assessed by in-sample and out-of-sample predictions.