

Skewed Normal Variance-Mean Models for Asset Pricing and the Method of Moments

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Summary

Financial returns (log-increments) data, $Y_t, t = 1, 2, \dots$, are treated as a stationary process, with the common distribution at each time point being not necessarily symmetric.

We consider as possible models for the common distribution four instances of the General Normal Variance-Mean Model (GNVM), which is described by $Y|V \sim N(a(b+V), c^2V+d^2)$ where V is a non-negative random variable and a, b, c and d are constants. When V is Gamma distributed and $d=0$, Y has the skewed Variance-Gamma distribution (VG). When V follows a Half Normal distribution and $c=0$, Y has the well-known Skew Normal (SN) distribution. We also consider two cases where V is Exponentially distributed. Bounds for skewness and kurtosis in each case are found in terms of the moments of the V . These are useful in determining whether the Method of Moments for a given model is feasible. The problem of overdetermination of parameters via estimating equations is examined. 5 data sets of actual returns data, chosen because of their earlier occurrence in the literature, are analysed using each of the 4 models.

Key words: Normal Variance-Mean distribution; Variance-Gamma distribution; Skewed Normal; Laplace distribution; Exponential distribution; Method of Moments; Skewness, Kurtosis.