The Polygonal Distribution

Dimitris Karlis† and Evdokia Xekalaki‡

†Department of Statistics, Athens University of Economics and Business.
‡Department of Statistics, Athens University of Economics and Business and Department of Statistics, University of California, Berkeley CA, USA

Abstract: The triangular distribution, although simpler than the beta distribution both for mathematical treatment and for natural interpretation, has not been widely used in the literature as a modelling tool. Applications of this distribution as an alternative to the beta distribution appear to be limited in financial contexts and specifically in the assessment of risk and uncertainty and in modelling prices associated with trading single securities. One of the basic reasons is that it can have only a few shapes. In this paper, a new class of distributions stemming from finite mixtures of the triangular distribution is introduced. Their polygonal shape makes them appealing for modelling purposes since they can be used as simple approximations to several distribution functions. Properties of these distributions are studied and parameter estimation is discussed. Further, the distributions arising when using the triangular distribution instead of the beta distribution as the mixing distribution in the case of two well-known beta mixtures, the beta-binomial and the beta-negative binomial distribution are examined.

Keywords and phrases: Triangular distribution; Binomial mixtures; Negative binomial mixtures; Triangular-binomial distribution