

# Non-Normally Distributed Variates With a Nonlinear Dependence Structure

A. H. POOI

Institute of Mathematical Sciences, Universiti Malaya, 50603 Kuala Lumpur

E-mail : [ahpooi@um.edu.my](mailto:ahpooi@um.edu.my)

**Research Report No. 13/2006**

## Abstract

Suppose  $u_1^*, u_2^*, \dots, u_n^*$  are a set of independent random variables and the  $i$ -th variate  $u_i^*$  has the quadratic-normal distribution with parameters 0 and  $\lambda^{(i)} = (\lambda_1^{(i)}, \lambda_2^{(i)}, \lambda_3^{(i)})^T$ . Let  $\tilde{\lambda}^{(i)}$  be a value such that the variance of  $u_i^*$  is one. Next let  $u_i$  be a quadratic function of the  $u_i^*$ , and  $t_i$  a linear combination of  $u_1, u_2, \dots, u_n$ . Then  $t_1, t_2, \dots, t_n$  will be a set of non-normally distributed variates with a nonlinear dependence structure. The joint distribution of  $t_1, t_2, \dots, t_n$  provides a method which is different from the copula approach for modelling real data.