CHANCE CONSTRAINED PROGRAMMING (CCP) WITH INDEPENDENT OR DEPENDENT EXPONENTIAL INPUT COEFFICIENTS

Nada Hafez, Afaf El-Dash & Nagwa Albehery
Department of Mathematics, Insurance and Applied Statistics, Faculty of commerce and Business Administration, Helwan University, Egypt.

ABSTRACT

In this paper, we consider Chance constrained programming (CCP) technique when at least two of the LHS input coefficients are random and distributed as two-parameter exponential distribution- Since two-parameter exponential distribution is more applicable in most real life applications than the single-parameter exponential distribution.
Two approaches are introduced to transform CCP into deterministic: (i) The first approach proposed under the assumption of independence between exponential variables and (ii) the second approach assumes that random input coefficients are dependent with correlation coefficient ρ.
The first approach of independence is an extension of Biswal's approach to deal with two-parameter exponential variables instead of single-parameter exponential variables. That is through two lemmas and a theorem for m independent input coefficients. The second approach of dependence uses Downton bivariate exponential distribution for reflecting the joint distribution of correlated input coefficients under two cases; the first introduced case assumes that dependent input coefficients have single-parameter exponential marginals and the second introduced case is an extension of Downton bivariate exponential distribution for case of two-parameter exponential random input coefficients. The deterministic equivalent of chance constraints are obtained through a theorem and a corollary for each case.
Finally; It was shown that the equivalent deterministic transformation for the extension of Downton exponential distribution for two-parameter exponential marginals is a generalization of the first approach for m=2 when the correlation coefficient is zero and the second approach for single-parameter exponential marginal when the second parameter is zero.

Keywords: *Bessel function, Bishwal approach, chance constrained programming, Downton bivariate exponential distribution, input coefficients, Non-linear programming, two-parameter exponential distribution.*

1. INTRODUCTION

In the ninet