

COLLOQUIUM

DEPARTMENT OF MATHEMATICS AND STATISTICS
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EQUILIBRIUM DISTRIBUTIONS AND DOMINANCE RELATIONS

Abstract

Equilibrium distributions were introduced as limiting distributions of forward or backward recurrence times in the context of Renewal Theory. Thus, they can be regarded as limiting distributions of used life or remaining life (upto or beyond a given point) in reliability analysis. We can also look upon these distributions as particular cases of weighted distributions, where the reciprocal of failure rate is chosen as the weight. It is interesting to note that the original and equilibrium distributions are identical only for the exponential case. Equilibrium distributions behave like any life distribution and we can examine the failure rate or mean remaining life or similar other functions used in the study of ageing properties for an equilibrium distribution. In fact, the failure rate of the equilibrium distribution is the reciprocal of the mean remaining life of the original distribution.

One can define bivariate or multivariate equilibrium distributions, not uniquely of course. One can also define equilibrium distributions of higher orders. In the context of life distribution comparisons (for two life or failure time random variables X and Y having p.d.f.s f and g respectively), we talk of several dominance relations viz. those in terms of failure rate, likelihood, failure rate average, mean remaining life, expectation, etc. besides stochastic dominance. Dominance relations between the original and the equilibrium distributions can imply different ageing properties of the original distribution (F). Thus, we have

Dominance Relation	Consequence
LR	F is IFR
FR	F is DMRL
FRA or d	F is NBUE
MRL	F is DVRL
E	C.V. of $F < 1$

368J Science and Engineering Building

Thursday, September 13th, 2001

3:00 to 4:00 P.M.

**(Refreshment at 2:30 to 3:00 P.M. in Room 368,
Science and Engineering Building)**

About the speaker

Professor Mukherjee earned his M.Sc. and Ph.D. from the Calcutta University. After a short stint of teaching at the Presidency College, he joined the Department of Statistics, Calcutta University as a lecturer (Assistant Professor) in 1964 and has been Centenary Professor of Statistics since 1982. He was Dean of the Faculty of Science during 1987-1991. His major areas of interest include Reliability Analysis, Stochastic Optimization, Estimation Problems. He has guided 18 Ph.D. students. He is a fellow of the National Academy of Sciences, the president of the Operational Research Society of India, and the president of the Indian Association of Productivity, Quality and Reliability.