

## A DYNAMIC CONTROL SYSTEM FOR HOSPITAL INVENTORIES

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This paper offers an approach to the inventory problem involving stochastic demand and stochastic lead time when only empirical distributions of these random variables are available. The proposed inventory model utilizes experimental optimization in a unique fashion to solve this problem.

Through the use of Monte Carlo simulation and a modified non-linear programming approach, an expected total cost objective function is minimized by the selection of appropriate reorder points and reorder quantities. The model is shown to be dynamic in nature and suitable for control of large inventories. The technique has been applied to several hospital inventory items and sample computations are included in the paper.

### DISTRIBUTION COMBINING PROGRAM

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The Distribution Combining Program is a set of algorithms that evaluates the probability distribution of the sum, difference, product, or ratio of two random variables with specified distributions. The method allows for correlation between the two input variables. The input

distributions are assumed to be from the semi-normal family (i.e., with density function that is composed of two normalized halves of normal densities with generally different variances). The resultant distribution is approximated by a distribution of the same type in order to provide subsequent use as an input in a series of operations.

The program uses the technique of calculating several moments of the output distribution from the moments of the input distributions. This method avoids using Monte Carlo simulations, or any numerical evaluation of the convolution integrals. The program can be used in risk analysis, subjective probability evaluation, sensitivity analysis and similar situations. It is particularly suitable to replace Monte Carlo methods where correlated variables are involved, or when rapid execution is desired.

MATHRISK - A MANAGEMENT TOOL  
FOR THE ANALYSIS OF  
INVESTMENT DECISIONS

Stephen L. Robinson  
Mathematica, Inc.

In recent years simulation has played an increasingly more prominent role in the analysis of new investment opportunities. Numerous computer programs have been created to facilitate the simulation of cash flows created by new investments. Such programs can usually be classed as either inordinately simple to use, in which case they are often quite inflexible, or quite difficult to use, for which price the user obtains a flexible program.

This paper describes the design criteria for a dynamic software system which is not only easy to use, but flexible enough to provide the user with progressively more complex modeling capability.