

Abstract

The Newsboy (Newsvendor) problem is probably the simplest of all stochastic inventory problems, involving a one-time purchase decision and a stochastic sales outcome. As an investment, it can be interpreted as the simplest stochastic version of the point-in, point-out investment problem of Jevons [Jevons, W.S., Theory of Political Economy, Macmillan, London 1871].

This paper provides a compound variation of the Newsboy problem. Instead of demand simply being known as to its distribution, here demand is generated by customers arriving at different points in time requiring amounts of varying size. Arrivals follow a renewal process, and amounts required are each taken from a second independent distribution.

It is shown how the optimal purchase quantity in explicit form depends on properties of the two distributions, maximising the expected net present value (NPV) of the payments involved. The solution to the compound problem will be the solution to the classical problem, if designing a special distribution for the demand process.

The developments make use of the relation between the NPV and the Laplace transform, simultaneously using the Laplace transform as a moment-generating function.