Theory and Methodology

Determining the optimal warranty price based on the producer's and customers' risk preferences [☆]

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Abstract

We propose a warranty model for the free-replacement, fixed-period warranty policy that determines the optimal warranty price for a given warranty period. We assume a constant failure rate for the product, constant repair costs throughout the warranty period, and a producer's and customers' risk aversion for future repair costs. Using the exponential utility function and the gamma failure rate distribution, we derive the decision model that maximizes the producer's certainty profit equivalent. Furthermore, the sensitivity of the optimal warranty price is analyzed with a numerical example with respect to such factors as (1) the producer's and customers' risk preferences, (2) their perceptions about the product failure rate, (3) the customers' loyalty to the original producer in repairing failed products, and (4) the customers' repair price.

Keywords: Warranty analysis; Risk aversion; Stochastic processes

1. Introduction

Under the typical situation of a warranty transaction, a consumer pays the warranty price at the time of product purchase, and a producer provides some kind of repair or replacement service for any product failures occurring during the warranty period. Thus, two of the producer's major decision variables in designing a warranty policy are the *warranty price* and the *warranty period*.

Assuming that the warranty *period* has been already determined by other restrictions such as government regulations or competitive companies' marketing strategies, we focus in this paper on how to determine the optimal warranty *price* for a given warranty period. In determining the optimal warranty price, we take into account such factors as (1) the producer's and customers' risk preferences, (2) their perceptions about the product failure rate, (3) the producer's technical monopoly in repairing failed products, and (4) the customers' repair price.