Appendix B: THE PRODUCT-LIMIT ESTIMATOR

The product-limit estimator for the distribution of lifetime cost, S(c) is given by:

$$\hat{S}(c) = \prod_{j<c} P_j,$$

where

- c is a level of lifetime *cost* attained by a case who died.
- j is a ranking from 1 *to J* for the J levels of lifetime cost attained by cases who died.
- P_j is the proportion of cases surviving to attain higher cost levels among all cases observed to attain the jth cost level.
- $\prod_{j<c}$ is the product calculated over all j less than c.
- $\hat{S}(c)$ is the estimated proportion of all cases whose lifetime cost will be more than c.

The product-lirnit estimate of median lifetime cost is the cost level c for which S(c) - 0.5; the estimate of mean lifetime cost is the area beneath a plot of S(c); namely,

$$\hat{\mu} = \sum_j \hat{S}(c_j)\,(c_j - c_{j-1})$$

Ninety-five percent confidence limits are presented for this mean lifetime cost, using the variance estimator

$$\mathrm{Var}(\hat{\mu}) = \sum_c (A_c^2 \hat{\mu}\%)/[n_c(n_c - d_c)],$$

where

- d_c is the number of cases who die at cost level c, and
- n_c is the number of cases who attain a cost of c or more, and

$$A_c = \sum_{j>c} \hat{S}(C_j)\,(C_j - C_{j-1})$$