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A comparison of methods of approximations for probabilities of death for fractions of a year. (English) [Zbl 0979.91043](#)

Appl. Stoch. Models Bus. Ind. 17, No. 3, 245-260 (2001).

This paper deals with the comparison of methods of approximations for probabilities of death for fractions of a year. Let human lifetime X be a continuous random variable with distribution function $F(x)$. Let $\bar{F}(x)$ denote the empirical lifetime distribution and $\hat{F}(x)$ denote the interpolating function of $\bar{F}(x)$ such that $\hat{F}(x) = \bar{F}(x)$ at integer points $x = 1, \dots, \omega - 1$, where ω is the maximum age for human being. The author considers four methods of approximation:

$$(1) \hat{F}(x+u) = \bar{F}(x) + u(\bar{F}(x+1) - \bar{F}(x));$$

$$(2) \hat{F}(x+u) = 1 - (1 - \bar{F}(x+1))^u (1 - \bar{F}(x))^{1-u};$$

$$(3) \hat{F}(x+u) = 1 - \frac{(1 - \bar{F}(x))(1 - \bar{F}(x+1))}{u(1 - \bar{F}(x)) + (1-u)(1 - \bar{F}(x+1))};$$

$$(4) \hat{F}(x+u) = (\bar{F}(x+2) - \bar{F}(x+1))(u^3 - u^2) + (\bar{F}(x+1) - \bar{F}(x))(u + u^2 - u^3) + \bar{F}(x),$$

$$u \in [0, 1], x = 0, 1, \dots, \omega - 1.$$

Two criteria based on the Kolmogorov statistic and the measure of distance $L^2(x)$ are used. The author shows that none of the four methods are better than the other three.

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MSC:

91B30 Risk theory, insurance (MSC2010)

Keywords:

methods of approximations; probabilities of death; lifetime distribution; Kolmogorov statistic

Full Text: [DOI](#)

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