



New kernel estimators of the hazard ratio and their asymptotic properties

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Abstract

We propose a kernel estimator of a hazard ratio that is based on a modification of Ćwik and Mielniczuk (Commun Stat-Theory Methods 18(8):3057–3069, 1989)’s method. A naive nonparametric estimator is Watson and Leadbetter (Sankhyā: Indian J Stat Ser A 26(1):101–116, 1964)’s one, which is naturally given by the kernel density estimator and the empirical distribution estimator. We compare the asymptotic mean squared error (*AMSE*) of the hazard estimators, and then, it is shown that the asymptotic variance of the new estimator is usually smaller than that of the naive one. We also discuss bias reduction of the proposed estimator and derived some modified estimators. While the modified estimators do not lose nonnegativity, their *AMSE* is small both theoretically and numerically.

Keywords Kernel estimator · Hazard ratio · Nonparametric estimator · Mean squared error

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