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## Higher Order Approximation of the Probability Distribution of the Ratio Estimator for a Regression Model

Shinichi Kawai<sup>1)</sup>
*1) National Research Institute for Earth Science and Disaster Prevention*

**Abstract:** In the present paper, we consider the problem of estimating a ratio  $\rho = E(Y) / E(X)$  in a regression model  $Y = \alpha + \beta X + U$ . We obtain the higher order approximation of the probability distribution of the usual ratio estimator based on the sample means. In the gamma, lognormal and exponential cases, the approximation is numerically compared with the normal one and the empirical distribution. We also consider the higher order approximation of the percentage point and the construction of the confidence interval by using the approximation.

**Key words:** Cornish-Fisher expansion, Edgeworth expansion, higher order approximation, ratio estimator, regression model

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