

under heteroscedasticity because it implicitly assumes that the true residuals all have the same distribution. We can assume instead that the distributions are different, say  $H_i$  for the  $i$ th residual and estimate each  $H_i$  in some way. Professor Wu's suggestion amounts to estimating the joint distribution of the residuals by a distribution having marginal mean 0 and variance  $r_i^2/(1 - w_i)$ . There are two problems with his suggestion: a) The resampled residuals are uncorrelated but not necessarily independent, as they should be, and more importantly, b) only the first two moments of this distribution are specified, so there is no hope of capturing higher-order effects. A method that estimated each  $H_i$  with the empirical distribution function of the residuals in some neighborhood of the  $i$ th point might hold more promise.

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DEPARTMENT OF PREVENTIVE MEDICINE  
 AND BIostatISTICS AND DEPARTMENT OF STATISTICS  
 UNIVERSITY OF TORONTO  
 TORONTO, ONTARIO M5S 1A8  
 CANADA

NEVILLE WEBER

*University of Sydney*

Wu's paper should be praised for clarifying the relationship between the various weighted and unweighted versions of the jackknife and the bootstrap and for giving simple examples to demonstrate the shortcomings of various methods. The paper also stresses the role of the jackknife in regression analysis as a means of obtaining an estimator for the covariance matrix of the least squares estimator,  $\tilde{\beta}$ , which is robust against heteroscedastic errors. This feature of the jackknife has not received enough emphasis in regression literature.

As noted by Weber (1986), Hinkley's weighted jackknife variance estimator,  $V_{H(1)}$ , is effectively the robust estimator proposed by White (1980), commonly used in econometrics. The new estimator  $V_{J(1)}$  has the consistency property of  $V_{H(1)}$ , but also has the advantage of being unbiased when the model has homoscedastic errors.

The bootstrap procedure in regression does not lead to a robust, consistent estimator of the covariance matrix of  $\tilde{\beta}$ . The bootstrap method based on resampling the residuals has the obvious shortcoming of imposing a linear model structure on the resampled values, forcing the error terms to be independent and identically distributed. Such a procedure loses any variation in the distributions