REFEREE REPORT: "OBJECT-ORIENTED COMPUTATION OF SANDWICH ESTIMATORS" BY ACHIM ZEILEIS

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The paper follows up on a previously published paper by the same author. It deals with sandwich-type estimation in econometric and statistical models. Perhaps the most commonly used sandwich estimator is that proposed by Halbert White is his 1980 *Econometrica* paper, which is useful when one estimates linear regressions under heteroskedasticity of unknown form. White's estimator is included in the analysis along with several other estimators. In that respect, the software described in the paper is quite general. In my view, such software is useful to practitioners. Its main merit lies in the unification and generalization of pieces of software that are spread throughout a few different R packages.

The model described in Section 2 is indexed by θ, a $k \times 1$ parameter vector. The author focuses on the situation where "the objective function $\Psi(y, x, \theta)$ depends on x and θ in a special way, namely it does only depend on the univariate linear predictor $\eta = x^\top \theta$." Nonetheless, the most common setting is that where $\theta = (\beta^\top, \phi)^\top$, where β is a $(k-1)$-vector and $\phi > 0$. Here, $\eta = x^\top \beta$ and ϕ is the inverse of a dispersion parameter (i.e., it is a precision parameter; in the linear regression model, $\phi = \sigma^{-2}$, the reciprocal of the error variance).

It would be helpful to extend the heteroskedasticity-robust inference in light of the results in Godfrey (2006); see also Godfrey and Orme (2004). The numerical evidence in Godfrey (2006) suggests that tests based on *restricted estimation* are typically more reliable in finite-sample than those that employ unrestricted parameter estimates. One can then define the HC0R–HC4R analogs of the usual HC0–HC4 based tests. Note that one can either perform tests on single coefficients or tests on several regression parameters at once. This would make a nice addition to the described R package.

I would like to see an additional illustration in Section 5. I suggest the addition of an empirical example that deals with heteroskedasticity-robust estimation, perhaps even the application in Cribari-Neto (2004), or an empirical illustration that employs HAC estimation.

REFERENCES

[1] Cribari-Neto, F. (2004). Asymptotic inference under heteroskedasticity of unknwon form. *Computational Statistics & Data Analysis*, **45**, 215–233.
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[3] Godfrey, L.G. & Orme, C.D. (2004). Controlling the finite sample significance levels of heteroskedasticity-robust tests on several linear restrictions on regression coefficients. *Economics Letters*, **82**, 281–287.