An empirical likelihood approach for conditional estimating equations

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Abstract. We proposed a new empirical likelihood approach for parameters defined by conditional estimating equations [4]. The conditional estimation equations framework considered includes a wide range of statistical models like (non)linear mean regressions, quantile regressions and transformation models. Econometric literature provides more examples: (non)linear simultaneous equations, econometric models of optimising agents [2] and regression models with endogenous covariates. We propose to extend the empirical likelihood approach [3, 5, 6, 7] extended by [1] for complex sampling designs. The inference approach proposed takes the effect the sampling designs (unequal probability and stratification) and of the auxiliary variables (calibration) into account. We show that the proposed estimator is design consistent and how the empirical log-likelihood ratio function can be used to construct confidence intervals and to test hypotheses. The proposed confidence interval does not rely on variance estimates, design-effects, re-sampling or linearisation, despite the fact that the parameter of interest is not linear.

Keywords. Calibration, Conditional estimating equations, Design-based approach, Stratification, Unequal inclusion probabilities,

Bibliography

[1] Berger, Y.G., et De la Riva Torres, O. (2013) , Empirical Likelihood confidence intervals for complex sampling designs, University of Southampton Working paper.
[2] Hansen, L.P., et Singleton, K.J. (1982) , Generalized instrumental variable estimation of nonlinear rational expectations models, Econometrica, 50(4),1269-1286.
[3] Hartley, H.O., et Rao, J. N.K. (1968) , A new estimation theory for sample surveys, Biometrika, 55(3),547-557.
[4] Lavergne, P., et Patilea, V. (2013) , Smooth minimum distance estimation and testing in conditional moment restrictions models. Journal of Econometrics, vol. 177(1), p. 4759..
[5] Owen, A.B. (1988) , Empirical Likelihood Ratio Confidence Intervals for a Single Functional, Biometrika, 75(2),237-249.
[6] Owen, A.B. (1991) , Empirical Likelihood for Linear Models, The Annals of Statistics, 19(4),1725-1747.
[7] Owen, A.B. (2001) , *Empirical Likelihood*, New York: Chapman & Hall.