Case II: unbounded ρ : Here an analogous but simpler procedure shows the existence of T_0 and neighborhoods $U(\alpha, \gamma)$ such that the left-hand member of (14) is larger than $2\lambda_0$, and the rest of the proof is similar.■

Proof of the Theorem: If A is not compact, we employ the same approach as in (Richardson and Bhattacharyya, 1986): the Čech-Stone compactification yields a compact set $\widetilde{A} \supset A$ such that each bounded continuous function on A has a unique continuous extension to $\widetilde{A}$. We have to ensure that (B), (D) and (E) continue to hold for $\alpha \in \widetilde{A}$. Since each element of $\widetilde{A}$ is the limit of a sequence of elements of A, (B) and (E) are immediate; and (D) follows from assumption (F). Therefore we can apply the Lemma to conclude that $\left(\widehat{\alpha}_n, \widehat{\beta}_n\right)$ remains ultimately in a compact a.s. The Theorem then follows from Theorem 1 of Huber (1967).■

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References

Bianco, A., Yohai, V.J., 1996. Robust estimation in the logistic regression model, in Robust Statistics, Data Analysis and Computer Intensive Methods, Proceedings of the workshop in honor of Peter J. Huber, editor H. Rieder, Lecture Notes in Statistics 109, 17-34 Springer-Verlag, New York.

Čížek, P., 2006. Least trimmed squares in nonlinear regression under dependence. Jr. Statist. Plann. & Inf., 136, 3967-3988.

Fasano, M.V., Maronna, R.A., Sued, M., Yohai, V.J., 2012. Continuity and differentiability of regression M functionals. Bernouilli (to appear).

Huber, P. J., 1967. The behavior of maximum likelihood estimates under nonstandard conditions, in Proceedings of the Fifth Berkeley Symposium