

Neyman smooth goodness-of-fit tests for the marginal distribution of dependent data

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Abstract We establish a data-driven version of Neyman’s smooth goodness-of-fit test for the marginal distribution of observations generated by an α -mixing discrete time stochastic process $(X_t)_{t \in \mathbb{Z}}$. This is a simple extension of the test for independent data introduced by Ledwina (J Am Stat Assoc 89:1000–1005, 1994). Our method only requires additional estimation of the cumulative autocovariance. Consistency of the test will be shown at essentially any alternative. A brief simulation study shows that the test performs reasonable especially for the case of positive dependence. Finally, we illustrate our approach by analyzing the validity of a forecasting method (“historical simulation”) for the implied volatilities of traded options.

Keywords Neyman’s smooth test · Goodness-of-fit · Strongly mixing process · Implied volatility