A NOTE ON ESTIMATORS OF GRADUAL CHANGES

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In the present paper we focus on the estimators in location models with gradual changes described by power α that can be known or unknown. Least squares type estimators of the parameters are studied. It appears that the limit behavior (both the rate of consistency and limit distribution) of the estimators of the change point in location models depends on the type of gradual changes.

AMS subject classifications: 62G20, 62E20, 60F17.
Keywords and phrases: gradual changes in location model, estimators.

1 Introduction and main results

Consider the location model with a change after an unknown time point m_n:

$$Y_i = \mu + \delta_n \Big(\frac{i - m_n}{n}\Big)_+^{\alpha_0} + e_i,\ i = 1, ..., n, \tag{1.1}$$

where $a_+ = \max(0, a)$, $\mu, \delta_n \neq 0$ and $m_n (< n)$ and $\alpha_0 \in [0, 1]$ are unknown parameters. We assume that

$$\begin{aligned} &e_1, ..., e_n \text{ are independent identically distributed random variables} \\ &Ee_i = 0, \quad 0 < \sigma^2 < \infty, \quad E|e_i|^{2+\Delta} < \infty \text{ with some } \Delta > 0 \end{aligned} \tag{1.2}$$

and

$$m_n = [\gamma n] \text{ with some } \gamma \in (0, 1), \tag{1.3}$$

where $[a]$ denotes the integer part of a. Concerning the slope parameter δ_n, we assume that, as $n \to \infty$,

$$|\delta_n| \to 0, \quad \frac{\sqrt{n}|\delta_n|}{\sqrt{\log \log n}} \to \infty, \tag{1.4}$$

which covers local alternatives ($\delta_n \to 0$), and if $\alpha_0 \neq 0$ also fixed alternatives ($\delta_n = \delta \neq 0$).

[1] This research was supported by the grant GAČR-201/97/1163 and by the grant CES:J13/98:113200008.