DETECTING OUTLIERS AND LEVEL SHIFTS IN TIME SERIES USING TSAY AND BALKE PROCEDURES

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ABSTRACT

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Balke (1993) considers only permanent level changes in evaluating Tsay's disturbance search procedure's ability to detect level changes. Balke (1993) has found out that Tsay's disturbance search procedure is less effective in detecting permanent level changes. Thus, Balke (1993) suggests a white – noise initialization in the disturbance search procedure and the procedure seems to improve the detection of the permanent level changes. Balke's omission of the possibility of transient level changes in the Tsay's disturbance search procedure is not supported by facts. Hence, this paper attempts to investigate the ability of Tsay's disturbance search procedure to detect transient level changes in time series. Based on simulated series with transient level change and permanent level change disturbances, the simulation results indicate that Tsay's disturbance search procedure is also not that effective in detecting transient level changes. However, the simulation results also show that for all parameter settings the transient level change statistic based on an estimated autoregressive (AR) parameter is sensitive to detecting a level shift when the disturbance size is sufficiently large. This suggests that Tsay's disturbance search procedure could also provide an accurate means to detect transient level changes in certain situations.