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RESEARCH ARTICLE

Testing for nonlinear unit roots in the presence of a structural break with an application to the qualified PPP during the 1997 Asian financial crisis

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Abstract

This paper applies Monte Carlo simulations to evaluate the size and power properties in the presence of a structural break, for the standard Augmented Dickey-Fuller (ADF) test versus nonlinear exponential smooth transition autoregressive unit root tests. The break causes the tests to be undersized, and the statistical power considerably decreases. Moreover, the effect is intensified in small samples and very much increased for more persistent nonlinear series. As a remedy, we modify the standard ADF and exponential smooth transition autoregressive unit root tests in order to adjust for a structural break. This improves both the power and the size considerably, even though the empirical size still is lower than the nominal one. More persistent series are more affected by structural breaks, and the new tests are most powerful under the existence of a rather persistent nonlinear data generating process (which is an empirically relevant and common type of data generating process). The proposed tests are applied to investigate mean reversion in the real effective exchange rates of 5 East and Southeast Asian countries, taking into account the structural change in exchange rate regime brought about by the 1997 Asian financial crisis. The empirical findings corroborate our simulation results; the modified more powerful tests are able to reject the unit root in all 5 countries, whereas the tests that do not consider the structural break could only reject in one of these cases.

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