

Mildly Explosive Processes and Economic Bubbles

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Abstract

The limit theory for autoregressive time series and cointegrated/interdependent time series with roots near unity suffers discontinuities and parameter dependencies that undermine conventional approaches to inference and, in the explosive direction, lead to failure in the invariance principle. In the first part of the talk, we will briefly overview some of these complications of the “Passage through Unity” and discuss some recent results by Phillips, Magdalinos and Giraitis that seek to negotiate the passage using models with autoregressive roots of the form $\rho_n = 1 + c/k_n$, which represent moderate deviations from unity when $k_n = o(n)$ as $n \rightarrow \infty$. For $c > 0$, the series generated by these models are mildly explosive and seem appropriate for the investigation of the phenomena of bubbles in economic and financial data.

The second part of the talk discusses some joint work with Jun Yu and Yangru Wu that examines models of rational economic bubbles and develops some empirical procedures for testing explosive behavior, date-stamping the origination and collapse of economic bubbles, and providing valid confidence intervals for the bubble growth rate. The method involves the recursive implementation of a right-side unit root test and a sup test, both of which are easy to use in practical applications, and the new limit theory for mildly explosive processes. The test procedure is shown to have discriminatory power in detecting periodically collapsing bubbles, overcoming a weakness in earlier applications of unit root tests for economic bubbles. An empirical application to Nasdaq stock prices in the 1990s will be discussed investigating the presence of a financial bubble and attempting to date-stamp the origination of the bubble in relation to the now famous remark in December 1996 by Alan Greenspan about irrational exuberance in financial markets.

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