

Testing for Multiple Bubbles

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Abstract

Identifying and dating explosive bubbles when there is periodically collapsing behavior over time has been a major concern in the economics literature and is of great importance for practitioners. The complexity of the nonlinear structure inherent in multiple bubble phenomena within the same sample period makes econometric analysis particularly difficult. The present paper develops new recursive procedures for practical implementation and surveillance strategies that may be employed by central banks and fiscal regulators. We show how the testing procedure and dating algorithm of Phillips, Wu and Yu (2011, PWY) are affected by multiple bubbles and may fail to be consistent. The present paper proposes a generalized version of the sup ADF test of PWY to address this difficulty, derives its asymptotic distribution, introduces a new date-stamping strategy for the origination and termination of multiple bubbles, and proves consistency of this dating procedure. Simulations show that the test significantly improves discriminatory power and leads to distinct power gains when multiple bubbles occur. Empirical applications are conducted to S&P 500 stock market data over a long historical period from January 1871 to December 2010. The new approach identifies many key historical episodes of exuberance and collapse over this period, whereas the strategy of PWY and the CUSUM procedure locate far fewer episodes in the same sample range.