

Specification Sensitivities in Right-Tailed Unit Root Testing for Financial Bubbles

Shu-Ping Shi

The Australian National University

and

Peter C. B. Phillips

Yale University

University of Auckland

University of Southampton

Singapore Management University

and

Jun Yu

Singapore Management University

Hong Kong Institute for Monetary Research

June 2011

Summary

Right-tailed unit root tests have proved promising for detecting exuberance in economic and financial activities. Like left-tailed tests, the limit theory and test performance are sensitive to the null hypothesis and the model specification used in parameter estimation.

This paper has investigated various formulations of the null and alternative hypotheses and the effect of the chosen regression model on the detection of exuberance in economic and financial time series. It provides some empirical guidelines for the practical implementation of right-tailed unit root tests, focusing on the sup ADF test (SADF) of Phillips, Wu and Yu (2011), which implements a right-tailed ADF test repeatedly on a sequence of forward sample recursions. In particular, we identify two empirically reasonable setups and neither setup includes a linear deterministic trend in the regression. In both cases, we estimate the autoregressive (AR) coefficient from the augmented AR model with the intercept. In one case the null hypothesis has an asymptotically negligible intercept while in the other case the intercept is a constant. The limiting distributions of the ADF statistic and the SADF statistic are derived in both cases. The asymptotic critical values are obtained via simulations.

We analyze and compare the limit theory of the sup ADF test under different hypotheses and model specifications. The size and power properties of the test under various scenarios are examined in simulations and some recommendations for empirical practice are given. An empirical application to Nasdaq data reveals the practical importance of model specification on test outcomes.