

# Panel Data Tests for a Bubble with an Application to OECD Housing Prices\*

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## Abstract

This paper introduces methods for testing the null of unit root against the alternative of a mildly explosive root in dynamic panels. Rejection of the null in this case is interpreted as evidence for a bubble in some of the panel members. To this end I specify two tests: The first is for sporadic explosive periods in panel members, based on the average of individual sup ADF (SADF) statistics (Phillips et al., 2011). The second test is for synchronized explosive periods, based on a recursive right tailed variation of the Im et al. (2003) panel unit root test. The limiting distributions of both statistics are derived under the assumption of cross sectional independence and are shown to converge to the standard normal distribution, as the time and cross sectional dimensions go to infinity sequentially. Monte Carlo simulations show that both tests have good finite sample properties. An empirical illustration is provided by applying both tests to a panel of real house price index series as well as house price to rent ratios for 22 OECD countries for the period of 1998:Q1-2014:Q1.

*Keywords:* Panel data, unit root test, mildly explosive root, bubbles, housing prices  
*JEL Classification:* C12; C22; C23

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