

**A New Panel Cointegration Test
with Unknown Heteroscedasticity and Cross-sectional Correlations**

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ABSTRACT

The search for increased power in macroeconomics hypothesis testing has led to a growing literature in panel unit root and cointegration testing (for surveys, see Baltagi and Kao, 2000, and Phillips and Moon, 2000). One popular approach by Levin and Lin (1993) and Quah (1994) gains power by imposing an identical coefficient on the autoregressive coefficient, and assumes the panel is either all stationary or nonstationary, while a second approach by Im, Pesaran and Shin (IPS, 1997) assumes the cross sections are i.i.d and pools t or LM statistics. Its alternative is that at least one series in the panel is nonstationary. In practice, however, both homogeneity over time and independence across cross-sections are unlikely; at the same time, it is likely that not all the series are stationary or nonstationary. This paper seeks to relax these restrictive assumptions common in the existing panel cointegration literature and proposes a new and more efficient panel cointegration test that has several advantages over prior tests.

The proposed panel test uses a modified SUR instrumental variable-type approach that accommodates for heteroskedasticity over time. The application of SUR allows for arbitrary cross-sectional correlations, while the use of instruments from other series extends Hansen's covariate work and thus increases efficiency since covariates from other series are likely to be correlated. Further, allowing for heteroskedasticity is important since the homoscedasticity assumption over time is unlikely in many macroeconomic time series. Since our model does not impose identical coefficients across series, our test statistics allows us to evaluate each cross-sectional series individually. This avoids the shortcoming of the traditional panel unit root tests such as Levin and Lin and IPS.

We apply the proposed new test to analyzing the relationship between nominal exchange rates and domestic and foreign prices in 15 OECD economies. Our preliminary results reject both the assumption of equal co-integration vectors across countries and the assumption of homoscedasticity over time. Our initial findings also indicate that no long run relationship exists for several countries, and most of the long-run relationships are significantly different from one for one.

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