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The purchasing power parity revisited: New evidence for 16 OECD countries from panel unit root tests with structural breaks

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Abstract

In this paper, we apply a range of univariate unit root tests including the Lagrangian multiplier (LM) univariate and panel unit root tests to examine PPP for 16 OECD countries. In addition to incorporating structural breaks in the univariate exchange rate series, we also incorporate structural breaks in the panel exchange rate models. Our main finding from univariate tests, with and without structural breaks and panel LM test with one break, is that real exchange rates are not stationary, inconsistent with PPP hypothesis. However, when we incorporate two structural breaks in the univariate LM test, for most countries we find that real exchange rates are stationary. Moreover, we obtain overwhelming support for PPP when we apply panel LM unit root tests with two structural breaks.

JEL classification: C22; F21

Keywords: PPP; Real exchange rate; Unit root tests

1. Introduction

Purchasing power parity (PPP) asserts that the change in exchange rates between two currencies is determined by the relative prices of the two countries. Since the work of Frankel (1986) and Galliot (1970), a consensus view has emerged on the theoretical front supporting the fact that convergence of PPP is slow. Consequently, PPP is deemed a long period theory and is considered an essential building block in international monetary economics. Over the last couple of decades,

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a plethora of studies have emerged on PPP. To obtain evidence for or against PPP, one strand of the literature (see, inter alia, Taylor and Sarno, 1998; Narayan, 2005, 2006) subjects the real exchange rate series to unit root tests. The main idea here is that if the real exchange rate contains a unit root, then the PPP hypothesis is violated, while if the real exchange rate is found to be stationary then this is taken as strong evidence in favour of long run PPP.

The fact that empirical research has not reached a consensus view on whether or not PPP holds makes this subject that much more interesting and attractive. The mixed results on PPP are often attributed to the low power of the univariate unit root tests. There are two avenues for increasing the power of univariate unit root tests. One is to increase the sample size, while the other is to adapt a panel data approach, following the work of Quah (1994). Hence, from within the group of studies based on unit root tests, there has emerged a subset of studies that apply panel unit root test procedures to examine stationarity of real exchange rates (see, inter alia, Taylor, 2002; Ho, 2002). Despite attempts to increase power of the unit root tests by undertaking the panel data approach, there are still conflicting empirical results.

In this paper, we add to the literature along the lines of Papell (2002) by incorporating structural breaks in the real exchange rate series for 16 OECD countries. However, our study differs from Papell in that we use the Lagrangian multiplier (LM) panel unit root test developed by Im et al. (2005), which has the advantage of utilizing both panel data and structural breaks when testing for a unit root. Hence, a contribution of this paper is that not only do we examine stationarity in a panel framework but we also use a new panel unit root test that allows for structural breaks in the data series.

Briefly foreshadowing our main results, using the univariate tests, with and without structural breaks and panel LM test with one break, we find that real exchange rates are non-stationary, inconsistent with PPP hypothesis. However, when we incorporate two structural breaks in the univariate LM test, for most countries, we find that real exchange rates are stationary. Moreover, we obtain overwhelming support for PPP when we apply panel LM unit root test with two structural breaks. Subsequently, we show that including structural breaks in modelling the integrational properties of the real exchange rate series is crucial in providing support for PPP.

The rest of the paper is organized as follows. In the next section, we provide a brief overview of the econometric methodologies. In Section 3, we discuss the empirical results, while in the final section we provide some concluding remarks.

2. Methodology

In this section, we provide a brief explanation of the univariate unit root tests used in the empirical analysis in this paper. Given that the Augmented Dickey and Fuller (ADF, 1979, 1981), Phillips and Perron (PP, 1988) and the Kwiatkowski–Phillip–Schmidt–Shin (KPSS, 1992) tests are widely used in the literature, to conserve space, we do not discuss these methodologies here. We, however, provide a brief description of the modified Dickey–Fuller test based on generalized least squares (DFGLS) and the point optimal test suggested by Elliot et al. (1996). We also discuss the univariate and panel LM unit root tests with structural breaks. Following several recent studies (see, inter alia, Kargbo, 2003; Narayan, 2006), we include a time trend in the model for unit root test.

2.1. ERSPO and DFGLS tests

Elliot et al. (1996) propose two modified versions of the Dickey–Fuller t test – the DFGLS and point optimal tests – which have substantially improved power over the ADF test when an