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# Searching for stationarity: Purchasing power parity under the current float

David H. Papell\*

*Department of Economics, University of Houston, Houston, TX 77204-5882, USA*

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## Abstract

Using panel data methods, we investigate long-run purchasing power parity by testing for unit roots in real exchange rates of industrial countries under the current float. The evidence against the unit root hypothesis is stronger for larger than for smaller panels, for monthly than for quarterly data, and when the German mark, rather than the United States dollar, is used as the base currency. While we find that accounting for serial correlation considerably weakens the evidence against the unit root null, the results as a whole are consistent with long-run purchasing power parity.

*Keywords:* Purchasing power parity; Real exchange rates; Unit roots; Panel data model

*JEL classification:* F30; C23

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## 1. Introduction

Does purchasing power parity (PPP) hold during regimes of flexible nominal exchange rates? When the current float began in 1973, it was often asserted that nominal exchange rates would adjust to movements in relative prices to be consistent with PPP. While, with the benefit of over 20 years of evidence, it is obvious that short-run PPP does not hold, the relevance of long-run PPP is still a very open question.

The most commonly used formal tests for long-run PPP consist of testing whether the real exchange rate has a unit root. If the unit root hypothesis can be

\*Tel: (1-713) 743-3807; fax: (1-713) 743-3798; e-mail: dpapell@uh.edu

rejected, there is evidence of mean reversion of the real exchange or, equivalently, long-run PPP. Alternatively, since cointegration between the exchange rate, domestic price level and foreign price level is a necessary condition for PPP, evidence of PPP can be found by testing the null hypothesis of no cointegration among these variables.<sup>1</sup>

The empirical evidence for the post Bretton Woods period has been mixed. While several authors report evidence in favour of mean reversion, evidence against the unit root hypothesis is elusive. Whether one uses conventional Augmented-Dickey-Fuller (ADF) tests or a variety of more powerful alternatives, the unit root null is typically rejected only occasionally. The problem, of course, is that it is impossible to determine whether the failure to reject the unit root hypothesis is caused by the low power of unit root tests in small samples, or whether the unit root null cannot be rejected because it is the correct hypothesis.<sup>2</sup>

One response has been to utilize longer spans of data. Frankel (1986); Lothian and Taylor (1996), among others, reject the unit root hypothesis with a century (or more) of real exchange rate data. These studies, however, combine data from fixed and floating exchange rate periods, and do not provide direct evidence on PPP under flexible exchange rates.<sup>3</sup>

All of the work discussed so far considers countries individually. Recently, a number of researchers have turned to panel data methods in an attempt to find more evidence of long-run PPP in current floating exchange rate data. This has been in part inspired by the work of Levin and Lin (1992), who showed that, in situations where there is not enough time series variation to produce good power in unit root tests, a relatively small amount of cross-section variation can result in substantial improvement.

Although the recent float would appear to be a good candidate for panel data methods, the empirical evidence has also been mixed. While Lothian (1994); Frankel and Rose (1996) find evidence in favour of mean reversion, rejecting the unit root hypothesis remains problematic. Hakkio (1984) is unable to reject the random walk hypothesis with a sample of four exchange rates against the dollar. Abuaf and Jorion (1990), using monthly data from 10 industrialized countries, find only weak evidence against the unit root hypothesis. Frankel and Rose (1996), using annual data for a larger sample of industrialized countries, can only reject the unit root null if they impose a homogeneous intercept across countries.

Several recent papers, however, use panel methods and report much stronger rejections of the unit root hypothesis for real exchange rates during the post

<sup>1</sup> While cointegration is necessary for PPP, it is not sufficient. PPP also requires symmetry between domestic and foreign prices and proportionality between relative prices and the exchange rate.

<sup>2</sup> Among many others, Huizinga (1987) finds evidence of mean reversion while Enders (1988) fails to find evidence against unit roots for real exchange rates. Edison et al. (1994) find moderate evidence of cointegration between the exchange rate and relative prices.

<sup>3</sup> Engel (1996) argues that long time series tests of long-run PPP may spuriously reject the unit root null. Froot and Rogoff (1995) survey this literature.

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