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Re-examining long-run purchasing power parity

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Abstract

Our results complement the recent findings of real exchange rates as stationary processes. Applying a battery of unit root tests can be problematic, since the tests are sensitive to the specifics of the time-series process. The novelty of our approach is in emphasizing the information content of the data to distinguish between the competing processes. Stationary and non-stationary *ARIMA* processes are fitted to the US/UK real exchange rate series, covering 134 years. Artificial data are generated, and the small sample distributions of the chosen test statistics are computed under each of the two hypotheses. The values of the actual sample statistics seem to come rather from the stationary than from the non-stationary process.

JEL classifications: C22; C52; F31; F47

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1. Introduction

The question regarding the existence of the unit root in the real exchange rate is important, both from the theoretical as well as the practical point of view. Whether real exchange rates are stationary or non-stationary matters, since the two alternatives are associated with two quite different long run economic implications. In the former, purchasing power parity (PPP) is viewed as a good long-run first approxi-

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mation. This is the starting point for practising economists when they base their predictions of long-run exchange rates on some concept of PPP, or equilibrium real exchange rates, and use PPP considerations when making decisions on fixing parities between currencies. In the latter, PPP serves no purpose, even over the long-run. The finding of a unit root in the real exchange rates, which is what several econometric studies suggest, would be problematic for many of the established theories, and would make long run forecasting a useless exercise.

Econometric studies, applying unit root or cointegration tests to post-1973 data, typically fail to support purchasing power parity. However, studies that extend data over longer time spans, or use a cross-section of currencies, tend to find support for the PPP. For discussion of empirical results see Froot and Rogoff (1995) for an excellent survey. Frankel and Rose (1995), Pedroni (1995) and Wu (1996) constitute a partial list for applications of panel unit root testing techniques.

The literature has offered some possible interpretations of these results. The low power of the unit root tests against persistent alternatives in small samples is a likely explanation. Related to this may be the very slow mean-reversion in the real exchange rate. It hence requires much data for inference on unit roots to be reliable. One may also argue that little is known about the capability of the tests in distinguishing the relevant alternatives in the particular time series.

Some recent studies have focused on casting doubt on 'the new consensus' of rejecting the unit root. Engel (1996) points out that the empirical findings supporting the PPP in long data series may be due to the size biases of the tests, leading to a false rejection of the unit root, even with long data series.[1] O'Connell (1998) points to the failure of the panel studies to control for cross-sectional dependence, and finds little evidence against the random walk null in panels after controlling for this. This is a somewhat misdirected exercise, however, in the sense that the hypothesis we ought to be testing is the stationarity of the real exchange rates rather than the unit root.

In this study, we look at the robustness of the results of different types of tests in the case of the stationarity null and non-stationary alternative, along with the standard reverse set-up for testing. Since the power and the size of the unit root tests in general are quite sensitive to the specifics of the time series involved even in simple processes, it may be more informative to start with the data, and let the data decide which is the best fitting process involving a unit root and the best fitting stationary process, respectively. We examine a single relatively long time series (annual series of the real exchange rate between the US and the UK over 134 years). A stationary AR(p) process and a process with a unit root, *ARIMA*(p,1,0) are fitted to the series. The focal point of our exercise is to draw inferences on which of the two processes the real exchange rate series is more likely to come from. To this purpose, finite sample simulation techniques are applied to distinguish between the alternatives. By simulating the small sample distributions of the

[1] He points out that if the real exchange rate consists of a stationary component and a simple random walk component, then an ARMA presentation of the series involves a MA component, which may create significant size biases. See also Schwert (1989) for Monte Carlo simulations.