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## Purchasing power parity in LDCs: An empirical investigation

Augustine C. Arize\*

College of Business and Technology, Texas A&M University – Commerce, Commerce, Texas 75429, USA

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### ABSTRACT

Using the real effective exchange rate (REER) data of sixty-six developing countries and a more extensive monthly dataset from 1980:1 through 2009:10 (i.e., 358 observations), this study examines whether the REER is stationary, using two approaches. The two tests are the KPSS and the KSS test. In contrast to previous studies, we found overwhelming support for the long-run purchasing power parity (PPP) hypothesis; thus, the PPP is a suitable guide for exchange rate determination and exchange rate policy reform in LDCs. We attribute our finding to using REER data as well as linear and nonlinear tests with different null hypotheses.

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## 1. Introduction

There exists a large literature on the empirical validity of the purchasing power parity (PPP) hypothesis that examines whether real exchange rates are stationary. Absolute PPP asserts that real exchange rates ought to be constant and equal to one. The thrust of the hypothesis is that the PPP provides an equilibrium relationship for the real exchange rate, which is the nominal exchange rate adjusted for the relative national price levels. Therefore, if the PPP holds, relative prices and nominal exchange rates would adjust in a manner that causes the real exchange rate to be constant. Therefore, variations in the real exchange rate represent deviations from the PPP, which are assumed to be stationary (see, for example, Bahmani-Oskooee, Kutan, & Zhou 2009; Taylor 2006; Sarno & Taylor 2002; Sarno 2005; Cheung & Lai 1998; Rogoff 1996).

Although the existing evidence is mixed, long-run PPP has had a long history of being used as the cornerstone of many exchange rate determination models, as an equilibrium exchange rate relation by itself and as reference in policy decisions, especially when comparing the real purchasing power between countries. Important questions such as whether exchange rates adjust to equalize purchasing power across

\* Corresponding author. Tel.: +1 903 886 5691; fax: +1 903 886 5693.

E-mail address: [Chuck\\_Arize@tamu-commerce.edu](mailto:Chuck_Arize@tamu-commerce.edu).

countries, and if so, how fast they adjust, have major policy implications. Understanding the adjustment process can lead to improved forecasts that can benefit both market participants and policymakers. For example, the nature of the major impulses influencing exchange rate movements and the degree of adjustment are often helpful to government officials in deciding the relevant monetary, fiscal and exchange rate policies to be followed in adjusting macroeconomics variables such as the trade balance.

Because of the introduction of unit root tests, many researchers have employed them to assess whether the real exchange rate (RER) data are consistent, in a statistical sense, with the long-run purchasing power parity (PPP). The most common practice of earlier studies (see, for example, Taylor 1988 and Bahmani-Oskooee 1993) is to use the Augmented Dickey–Fuller (ADF) test to investigate the existence of a long-run PPP. This is done by testing whether the RER series has a unit root. If one can reject the unit-root characteristic of the series, then support for long-run PPP (or equivalently, evidence of mean reversion of RER) is concluded. However, the evidence has generally provided minimal support for the PPP hypothesis, leading one to infer that the practical uses of the PPP concept are highly limited and, therefore, give little or no hope to the predictions of open economy macroeconomics, which relies on long-run PPP (Sarno 2001).

Work by Rogoff (1996: 644) called these sets of evidence “the abject failure” of the law of one price, since they suggest that RER behaves as a random walk. A random walk RER does not revert to a constant mean. In that sense, it is not mean-reverting, and appreciations or depreciations will not offset inflation differentials. In sum, a nonstationary RER invalidates PPP, whereas a stationary RER indicates that the PPP holds in the long-run. A number of possible reasons have been mentioned in the literature for the weak evidence for PPP. These include price stickiness (Dornbusch 1976) as well as the explanation based on trade costs (e.g., Dumas 1992) and price discrimination (e.g., Chari, Kehoe, & McGrattan 2000), the use of aggregate price levels; noteworthy is the fact that the aggregate prices include the price of nontraded goods which generally adjust to parity at a faster rate because the cost of production (e.g., wages) tends to adjust quickly to (mean) equilibrium (Taylor, Peel, & Sarno 2001).

The purpose of this study is to empirically investigate the validity of PPP in sixty-six less developed countries (LDCs) over the monthly period 1980:1 through 2009:10. There are several values added of this study concerning PPP in LDCs. The first is the number of LDCs studied and the sample periods are particularly extensive. In addition, they enable us to speak on question of sample-selection bias hypothesis (SBH).<sup>1</sup> With the exception of one or two studies, existing studies of PPP mentioned earlier are problematic because they focus on countries that are fairly homogeneous with regard to the degree of economic development. This is not the case with our data set. The second value added is to provide information on whether PPP has been stable for LDCs. We do this, by comparing the results from 1980:1–2005:8 to those obtained from the full-sample period noted above. As is well known but often ignored in empirical research, parity reversion in real exchange rates may be affected by numerous factors. Hence, we examine whether previous results can be sustained over our full sample period.

The third value added is that we use real effective exchange rate instead of bilateral real exchange rate data employed by some of the existing studies. The use of the real effective exchange rate (REER) enables us to avoid issues concerning the possibility of dominance of numeraire currency. This is so because REER is an average (weighted) of bilateral exchange rates and averaging is more likely to eliminate the effects of the base country's experience on the index, hence it allows for a test of PPP based on multiple trading partners.

The fourth value added is that we use Kwiatkowski–Phillips–Schmidt–Shin tests (1992; KPSS hereafter) which have the null hypothesis of stationarity (i.e., linear adjustment towards PPP) and the alternative of a unit root (i.e., no adjustment towards PPP). In addition to the linear tests, we employ new tests by Kapetanios, Shin, and Snell (2003; KSS hereafter), which are of the nonlinear-type and have the null hypothesis of a unit root or nonstationarity (i.e., no adjustment towards PPP), which is tested against the alternative of stationarity (nonlinear adjustment towards PPP). The linear and nonlinear tests are applied to monthly real effective exchange rate (REER). In so doing, the test methods applied here are based on two different null hypotheses: the null is stationarity in the KPSS method, and it is nonstationarity for the KSS tests. From a statistical standpoint, we know that it is inappropriate to rely on the performance of a single

<sup>1</sup> The argument behind the sample selection or survivorship bias is that long-span time series studies, which support PPP focus on real exchange rates between industrialized countries for which Harrod–Balassa–Samuelson (HBS) effect is less observed (Froot & Rogoff 1995). They suggest that caution is necessary when interpreting results from such studies because by failing to include LDCs, such studies are likely to suffer from sample selection bias.

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