



## Further evidence on purchasing power parity and country characteristics

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### ABSTRACT

Using data from 76 countries, this paper investigates the relationship between country characteristics and the validity of purchasing power parity (PPP). Several interesting results are obtained based on dollar-based exchange rates. First, PPP holds for Africa and Latin America. Further, PPP tends to be supported for countries with high or moderate openness, low growth rates, high inflation rates and high nominal exchange rate volatility, respectively. Second, a single country characteristic seems inadequate to account for the validity of PPP. Third, PPP is supported if countries satisfy at least two characteristics of supporting PPP simultaneously. Finally, the main results of the paper are robust when the numeraire currency changes from the US dollar to Japanese yen.

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### 1. Introduction

Over the past two decades, issues related to purchasing power parity (PPP) have been ardently discussed in empirical international finance. It is widely accepted that PPP performs poorly in the short run and hence studies focus on PPP as a long-run phenomenon. Empirical results from conventional unit-root tests, such as augmented Dickey–Fuller (ADF) tests, for individual countries during the post-Bretton Wood period typically provided little support for PPP (Mark, 1990). A common explanation for the failure of supporting PPP is due to the low power of conventional unit-root tests arising from the short span of data (Shiller, & Perron, 1985; Froot, & Rogoff, 1995). To circumvent the criticism of a small sample size, panel unit-root tests have been widely applied to test the stationarity of real exchange rates (Wu, 1996; Papell, 1997; Chiu, 2002). O'Connell (1998) points out that controlling contemporaneous correlation across individuals is important in panel unit-root tests. Allowing for heterogeneity and cross-sectional dependence across individuals, several articles find support for long-run PPP for industrialized countries (Abuaf, & Jorion, 1990; Wu, & Wu, 2001).

With the exception of discussing long-run PPP among industrial countries, several authors have investigated the effects of country characteristics on PPP. Cheung, and Lai (2000) examine the effects of inflation, geographic regions, exchange rate regimes, productivity growth, trade openness, and government spending on PPP. They find that PPP is relatively easy to be observed among

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countries with fixed exchange rate regime, lower degree of development, higher inflation rates, and lower government spending ratios. [Alba, and Park \(2003\)](#) find evidence of PPP for high openness countries, for moderate or high inflation rate countries, and for low growth rate countries. [Alba, and Papell \(2007\)](#) find that PPP is likely to hold for countries with low inflation rates or growth rates, short distance to the US, and moderate nominal exchange rate volatility, respectively.

[Alba, and Park \(2003\)](#) and [Alba, and Papell \(2007\)](#) adopt a panel unit-root test that fails to control for contemporaneous correlation among data. In addition, these two papers focus on the effect of a single country characteristic on the validity of PPP. Moreover, country factors may be interdependent and neglecting the interdependency among factors may result in a false inference on the validity of PPP. For example, [Alba, and Papell \(2007\)](#) find that PPP tends to hold for countries in Latin America and for countries with low inflation rates or moderate nominal exchange rate volatility. However, countries in Latin America are well-known for their high inflation rates and high nominal exchange rate volatility.<sup>3</sup> [Alba, and Papell \(2007\)](#) point out the importance of country characteristics on the validity of PPP, but they fail to answer whether their results are caused by a single factor or related factors or both. It is therefore interesting to investigate if the single-factor results of PPP hold when the interactions between country characteristics are controlled.

The contribution of the paper is two folds. First, this paper adopts a newly developed panel unit-root test by [Pesaran \(2007\)](#) to re-examine the effects of country characteristics on PPP. One advantage of Pesaran's test is that it takes into account the contemporaneous correlation of data. Second, the current research discusses how a specific country characteristic affects PPP by controlling its relation with other characteristics, and then examines how two or more country characteristics simultaneously affect the validity of PPP.

Our empirical analysis provides a thorough examination on the significance of country characteristics to PPP. Several interesting results are observed. First, long-run PPP holds for the panel of all 76 countries and the panel of Africa and Latin America, respectively. Second, the validity of PPP is related to country characteristics and PPP tends to hold for countries with high or moderate inflation rates or openness, low growth rates, and high nominal exchange rate volatility, respectively. However, the above results may be reversed after controlling for the relations among characteristics. In other words, individual country characteristic may not be sufficient to explain PPP. Third, PPP holds if countries satisfy at least two or more characteristics of supporting PPP indicating the significance of country characteristics on the validity of PPP. Finally, the above results are not significantly affected if the base currency is changed from the US dollar to Japanese yen.

Focusing on the effect of a single country characteristic on PPP, [Alba, and Papell \(2007\)](#) provide evidence in favor of PPP for panels of countries with high openness, nearer and with similar (high) growth and (low) inflation as the US, and with moderate nominal exchange rate volatility. Our results differ with those of [Alba, and Papell \(2007\)](#) to some extent and the differences are likely to stem from the utilization of different panel unit-root tests. The economic intuitions of our results are elucidated.

The paper is organized as follows. [Section 2](#) discusses country characteristics and PPP. [Section 3](#) describes the panel unit-root test of [Pesaran \(2007\)](#) which is used to examine the stationarity of real exchange rates in different regions. The advantage of Pesaran's method is its consideration of contemporaneous correlation across individuals. [Section 4](#) provides our empirical results. Finally, [Section 5](#) summarizes our major findings.

## 2. Country characteristics and PPP

According to the discussion found in the literature, several country characteristics may affect the validity of PPP. They are trade openness, geographical distance, inflation rates, the growth rate of per capita real GDP, and nominal exchange rate volatility. PPP may hold better for countries with a high ratio of openness to trade. The reason is that arbitrage of tradable goods across countries corrects PPP deviations and induces parity in prices. [Alba, and Park \(2003\)](#) and [Alba, and Papell \(2007\)](#) find that PPP holds well in countries with high openness. However, [Bahmani-Oskooee, Kutanb, and Zhou \(2008\)](#) and [Cheung, and Lai \(2000\)](#) find that trade openness provides little evidence on the hold of PPP.

PPP tends to hold in high inflation rate countries since prices adjust quickly to ensure parity reversion. However, if countries intervene with foreign exchange markets preventing their exchange rates from adjusting to parity then PPP may hold better for similar inflation rates. Empirical findings in literature typically support that high inflation rates strengthen the evidence of PPP ([Frenkel, 1978](#); [McNown, & Wallace, 1989](#); [Cheung, & Lai, 2000](#); [Alba, & Park, 2003](#); [Bahmani-Oskooee et al., 2008](#)). Nevertheless, [Holmes \(2001\)](#) finds that PPP does not hold in high inflation countries. [Alba, and Papell \(2007\)](#) find that PPP holds better in low inflation countries.

Distance is also an important factor affecting the validity of PPP. The geographical proximity of countries makes goods arbitrage more effective since transportation costs are low. [Alba, and Papell \(2007\)](#) address the effect of geographical distance on the validity of PPP. Their empirical results indicate that PPP is likely to hold for countries with a short distance to the US.

The growth rate of per capita real GDP is another important determinant to the validity of PPP in the long run. According to the Balassa–Samuelson effect, an increase in the productivity of the tradable goods sector raises wages in both tradable and non-tradable sectors. The increase in the wage of non-tradable sector increases the price of non-tradable goods since there is no change in the productivity of non-tradable sector. Therefore, the general price level of the domestic country increases resulting in the deviation of PPP. From the above discussion, PPP may fail to be supported in high growth rate countries relative to low growth rate countries. [Froot, and Rogoff \(1995\)](#) observe that rapid income growth is often associated with drastic changes in the relative price

<sup>3</sup> In our sample, the average values of the inflation rate and nominal exchange rate in Latin America are 16.624% and 14.381%, respectively. They are much higher than the whole sample average. The average values of inflation rates and nominal exchange rates for 76 countries are 10.927% and 12.873%, respectively.

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