

## Revisiting Purchasing Power Parity of Papua New Guinea

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**Abstract-** Studies on long-run Purchasing Power Parity (PPP) for Papua New Guinea (PNG), one of the least developed countries in the world, is limited. Unlike the two existing studies, which consistently show no support for PPP, this note uncovers evidence of PPP for Papua New Guinea (PNG). Results from further analysis indicates that nominal exchange rates and relative prices are nonlinearly interrelated. This PPP in nonlinear dynamic fails to be detected in previous studies that did not include nonlinear analysis. Frictions in international trade could be behind the establishment of the above-mentioned nonlinear relationship.

**Keywords:** Purchasing power parity; Cointegration; Nonlinear; Rank tests; Least Developed country; Papua New Guinea.

### I. INTRODUCTION

Purchasing power parity (PPP) hypothesis suggests that exchange rates between two currencies are determined by the relative prices of the corresponding two countries. Its empirical validity has important implications for policy-makers who based their decision on PPP. Among others, PPP provides policy-makers a benchmark to judge whether a currency is over- or under-valued, and to monitor the movement of exchange rate. This is particularly vital in less developed countries (Wickremasinghe 2005; 2009).

The question whether PPP holds or not is usually answered with linear testing procedures and a considerable studies have been done for both developed and developing countries<sup>1</sup>. Two exceptional studies of Wickremasinghe (2005; 2009) are worth-mentioning. In a novel study, Wickremasinghe (2005) examines the validity of PPP for Papua New Guinea (PNG), one of the least developed countries according to Committee for Development Policy Report (United Nations 2006). Using the residual-based test for cointegration procedures, the author found evidence against PPP based on more recent unit roots tests of Ng and Perron (2001), which have better size and power properties than the commonly adopted Dickey-Fuller types test statistics. This finding of no long-run relationship between exchange rate and relative price was not overturned even with the adoption of several panel unit root tests, which have been found more powerful than those based on individual time series (Wickremasinghe 2009).

<sup>1</sup> See Taylor (2003; 2006; 2009) for a comprehensive overview on the recent development on long-run PPP studies. See also *Applied Economics Letters*, 16:1, 5 – 107 for a collection of the most recent empirical evidences supportive of the long-run PPP.

Note that, the above findings against PPP by the testing procedures formulated based on linear econometric frameworks, imply two possibilities. First, exchange rate and relative price are not interrelated at all. Second, exchange rate and relative price exhibit nonlinear relationship, which can only be uncovered by nonlinear testing frameworks. In this respect, market frictions, costs of arbitrage in international goods, and government intervention, among others have been identified in the literature as plausible sources of nonlinear dynamic in PPP relationship. For the case of PNG, Wickremasinghe (2009) mentions that the transportation costs prevailing in international trade may lead PPP to follow a nonlinear stochastic process. To formally examine if nonlinear PPP really exist in PNG, the current study revisits the long-run validity of PPP hypothesis for this country using the rank tests advanced by Breitung (2001), which is not only capable in the detection of cointegration, but can further distinguish linear from nonlinear relationship if cointegration exists<sup>2</sup>. The remainder of this note is organised as follows. Section II describes the rank tests for cointegration and for neglected nonlinearity. Section III presents the data and empirical results, while the final section concludes this letter.

### II. ECONOMETRIC METHODOLOGY

To test for the long-run relationship between nominal exchange rate ( $e_t$ ) and relative price ( $r_t$ ), the following bivariate rank test statistics are proposed by Breitung (2001):

$$B_1^* = \frac{\sup_{1 \leq t < T} |d_t|}{T \hat{\sigma}_{\Delta d}} \quad \text{and} \quad B_2^* = \frac{\sum_{t=1}^T d_t^2}{T^3 \hat{\sigma}_{\Delta d}^2}, \quad (1)$$

where  $e_t$  is defined as foreign price of PNG currency (kina) and  $r_t$  the relative price measured as the ratio of foreign consumer price index (CPI) to CPI of PNG.  $d_t = R(e_t) - R(r_t)$ , for  $R(x_t) = \text{Rank of } x_t \text{ among } (x_1, x_2, \dots, x_T)$  where  $T$  is the sample size and  $x_t = \{e_t, r_t\}$ .

Meanwhile,  $\hat{\sigma}_{\Delta d}^2 = T^{-2} \sum_{t=1}^T (d_t - d_{t-1})^2$  serves to adjust for possible correlation between the two series of interest.

<sup>2</sup> Thus far, Liew et al. (2009a, b) are able to uncover evidence of PPP for East and Central Asian countries respectively by these rank tests.