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AN ASIAN MONETARY UNION?*

This study examines the validity of the long-run purchasing power parity (PPP) hypothesis using a battery of both univariate and panel unit root tests for 10 Asian countries against Chinese Yuan and Japanese Yen. We found evidence against mean reverting when Yuan is used as the numeraire while stronger evidence of the parity condition with the Yen-based rates based on Breuer et al. (2002, SURADF). The initiation of the Asian Monetary Union may be foreseeable with Japan as the leader, it could start off with selected countries.

Keywords: *real exchange rate; China; Japan; Asian 10; Asian Monetary Union.*

JEL Cassifications: F36; C32; F00; F31; F40.

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ЧИ МОЖЛИВИЙ АЗІЙСЬКИЙ МОНЕТАРНИЙ СОЮЗ?

У статті дано оцінку гіпотезі про довготривалий паритет купівельної спроможності на основі одномірної статистики та методу одиничних коренів за даними 10 країн Азії, валюти яких протиставлено китайському юаню та японській єні. Продемонстровано, що у випадку використання юаня як основної валюти не спостерігається закон чергування, а для курсів, що спираються на єну, підтримується паритет цін. Саме тому для потенційного монетарного союзу в Азії доцільніше центральною країною обрати Японію, на початковому етапі краще, щоб союз складався з кількох обраних країн.

Ключові слова: *реальний курс валют; Китай; Японія; азійська "десятка"; азійський монетарний союз.*

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ВОЗМОЖЕН ЛИ АЗИАТСКИЙ МОНЕТАРНЫЙ СОЮЗ?

В статье дана оценка гипотезе о долгосрочном паритете покупательной способности на основе одномерной статистики и метода единичных корней по данным 10 стран Азии, валюты которых противопоставлены китайскому юаню и японской йене. Показано, что в случае использования юаня как основной валюты закон чередования не соблюдается, а для курсов, основанных на йене, поддерживается паритет цен. Поэтому целесообразней для потенциального монетарного союза в Азии центральной страной выбрать Японию, на начальном этапе союз должен состоять лишь из нескольких избранных стран.

Ключевые слова: *реальный курс валют; Китай; Япония; азиатская "десятка"; азиатский монетарный союз.*

1. Introduction. Asian monetary authorities were forced to make a drastic improvement on their exchange rate systems after the Asian financial crisis in 1997. Many countries adopted a more flexible exchange rate system after their recovery

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from the crisis. Soon, the talk on economic integration and monetary union became an endemic said to circumvent another downfall speculative attacking the economy of the region and strengthen the financial system (Rangkakulnuwat et al., 2010). An economic integration within the Asian region would be most feasible in order to counter such speculative attacks. Economic integration would make trade barriers freer among member nations, hence boosting the regional economics climate directly. Despite the fact that economic importance of Asia for the world economy is universally acknowledged to be huge (and still growing), the prospect of a common currency for the economies of that area has been less extensively researched in comparison to the Euro or the dollarization of Latin America (Karras, 2005). For realization of an Asian union, the common currency regime is undeniably an imperative element on which Asia would need to focus.

This paper follows the literature on purchasing power parity (PPP) which subjects the real exchange rate series to unit root tests by Rogoff (1996), Frankel and Rose (1996), Taylor and Sarno (1998), Culver and Papell (1999), Gil-Alana (2000), Kalyoncu and Kalyoncu (2007) and Narayan (2005, 2006, 2008). PPP is chosen for this study since it can reflect the degree of trade integration and liberalization among countries (Liew et. al., 2009). The simple notion suggests that if the real exchange rate contains unit root, the PPP theory will be violated. On the other side, if the real exchange rates are found to be stationary, the PPP theory holds and therefore Asian monetary integration would be realistic[4].

The aim of this paper is twofold. After determining the stationary properties of real exchange rates in 10 Asian countries against Yuan and Yen using univariate and panel analysis, we will discuss the suitability of the monetary integration with respect to PPP in Asian region . Using the Chinese Yuan and Japanese Yen as numeraires to the study against 10 other Asian countries' real exchange rates is practically more functional in comparison to previous literatures which tested the region's exchange rate against the USD (examples include Pontines & Siregar, 2005; Ogawa & Yang, 2006). It would be more rational for the region to consider the regime amongst its member countries itself. Several studies on Chinese Yuen (Ogawa & Yoshimi, 2009; Baharumshah et al., 2011; Wilson & Choy, 2007; Ogawa & Kawasaki, 2006) and Japanese Yen (Rangkakulnuwat et al., 2010; Ogawa & Yoshimi, 2009; Baharumshah et al., 2008; Bissoondeeal, 2008, and Wilson & Choy, 2007) found the importance of intraregional economic relations of these two big economies in Asian region.

Similar to the European Union, prior to the formation of an Asian union, it is vital to study if all Asian currencies are able to integrate. If the currencies hold to the theory of PPP, it is only inevitable that Asian monetary union is pragmatic. Conversely, if the currencies do not hold to the theory of PPP, the formation of the union is not foreseeable in the near future. The 10 Asian countries chosen for this study[5] changed their exchange rate regime prior to the financial crisis. A major reform was made by the China government on July 2005 when they decided to change its

[4] The PPP hypothesis is broadly accredited to Cassel (1916: 62) with his notion that the exchange rate of two currencies is determined by the price levels of the two countries. For comprehensive historical treatment of the PPP doctrine see Dornbusch (1987).

[5] Hong Kong (HK), India (IND), Indonesia (INDO), Malaysia (MLY), Myanmar (MYN), Pakistan (PKN), Philippines (PHL), South Korea (SK), Sri Lanka (SL) and Thailand (THAI) are the countries associated with this study.

exchange rate system from the de facto dollar-peg system to a managed floating exchange rate system with reference to a currency basket. Countries like India, Malaysia, Myanmar, Pakistan and Thailand opted for a managed floating system with no predetermined path for the exchange rate. While South Korea, Indonesia and Philippines choose the independently floating systems. Hong Kong and Sri Lanka adopted linked exchange rate system and conventional fixed-peg arrangement respectively for their monetary policy frameworks. The remainder of this paper is constructed as follows: section 2 illustrates the analysis of the empirical data, the next section present the results and the last section concludes.

2. Methodology

2.1. Data Description. Monthly data are taken for the respective countries' real exchange rate covering the span from M1 1981 to M10 2006 obtained via The International Monetary Fund's International Financial Statistics. Data for China is retrieved from The People's Bank of China's database. The real exchange rates are expressed in Chinese Yuan and Japanese Yen to test whether these currencies hold against the Yen or Yuan[6].

2.2. Theoretical Framework. We employ the purchasing power parity (PPP) theory to the hypothesis that if the real exchange rates are found to be stationary, PPP holds (Murray and Papell, 2005). The model starts with:

$$q = e + p^* - p \tag{1}$$

where q is the logarithm of the real exchange rate, e refers to the logarithm of the nominal numeraries while p^* and p are the logarithm of the consumer price index for numeraries and domestic respectively. Theoretically, when the real exchange rates are disturbed, it will revert to a constant mean in the long run. Testing the PPP hypothesis against the unit root test requires addition lag in (1) as shown below:

$$q_t = c + \alpha q_{t-1} + \sum_{j=1}^{k} \omega_j \Delta q_{t-j} + u_t, \tag{2}$$

where k denotes the lag of the first difference of the real exchange rate that allows for serial correlation. The univariate unit root tests null hypothesis of a unit root will be rejected in favour of the long run PPP if a is significantly less than 1. Alternatively, the equation (2) can be extended into a panel regression model that allows for a heterogenous intercept as well as serially and contemporaneously correlated errors written as:

$$q_{it} = c_i + \alpha q_{t-1} + \sum_{j=1}^{k_i} \omega_{ij} \Delta q_{i,t-j} + u_{it}, \tag{3}$$

where the value of α can be constant across countries or can be varied across countries depending on the types of the panel data employed.

2.3. Univariate and panel unit root test. Battery of univariate and panel unit root testing procedures will be employed for the investigation purpose to ensure the stability of the results. Univariate testing procedures (Said and Dickey, 1984; Kwiatkowski

[6] For the Yuan based currencies, the data spans from M1 2001 till M10 2006. The Yen based currencies are divided into 3 panels, namely the precrisis period (M1 1981 till M6 1997), post-crisis period (M7 1997 till M10 2006) and the full sample period (M1 1981 till M10 2006).

et al., 1992, KPSS and Elliott et al., 1996, DFGLS) We highlight the robustness of the single-equation unit root tests by continuing estimating using panel unit root testing procedure. It is also worth noting that Karlsson and Lothgren (2000) also suggested using both individual and panel unit root tests to fully assess the stationarity properties of any series. We utilize the Levin et al., 2002 (LLC), ADF-Fisher chi square and PP-Fisher chi-square (Maddala and Wu, 1999), Breitung, 2000 (UB), Hadri, 2000 (HADRI) and Im et al., 2003 (IPS) in our study. All the testing procedures share the same null hypothesis of a unit root except for HADRI, which has a null hypothesis of level (trend) stationarity and an alternative of difference stationarity in the panel.

2.4. Series-Specific Panel Unit Root Tests. A common feature of the panel test above is that they maintain the null hypothesis of a unit root in all panel members except for the HADRI test. Therefore, their (non) rejection indicates that at least one panel member is stationary, with no information on the number of series or which ones are stationary. As pointed out by Breuer et al., 2002 it may be erroneous to conclude that all series in the panel are stationary based on the panel unit root tests. With this caveat, Breuer et al., 2002 (SURADF) developed a test that involves the estimation of the ADF regression in a SUR framework and then tested for individual unit root within the panel members. The test minimized the possibility of the misleading conclusion of stationarity when only one (or some) of the panel member(s) behave in a stationary fashion. The SURADF test is based on the system of ADF equations which can be represented as:

$$\begin{aligned}
&\Delta y_{1,t} = \alpha_1 + \beta_1 y_{1,t-1} + \sum\nolimits_{j=1} \varphi_j \Delta y_{1,t-j} + u_{1,t} \\
&\Delta y_{2,t} = \alpha_2 + \beta_2 y_{2,t-1} + \sum\nolimits_{j=1} \varphi_j \Delta y_{2,t-j} + u_{2,t} \\
&\cdot \\
&\cdot \\
&\cdot \\
&\Delta y_{N,t} = \alpha_N + \beta_N y_{N,t-1} + \sum\nolimits_{j=1} \varphi_j \Delta y_{N,t-j} + u_{N,t},
\end{aligned} \tag{4}$$

where $\beta_j = (\rho_j - 1)$, ρ_j is the autoregressive coefficient for series j and $t = 1, \ldots\ldots, T$. This system is estimated by the SUR procedure with null and the alternative hypotheses are tested individually as:

$$\begin{aligned}
&H_0^1 : \beta_1 = 0; \quad H_A^1 : \beta_1 < 0 \\
&H_0^2 : \beta_2 = 0; \quad H_A^2 : \beta_2 < 0 \\
&\cdot \\
&\cdot \\
&H_0^N : \beta_N = 0; \quad H_A^N : \beta_N < 0
\end{aligned} \tag{5}$$

with the test statistics computed from SUR estimates of system (5) while the critical values are generated by Monte Carlo simulations.

This procedure poses several advantages. Firstly, by exploiting the information from the error covariance and allowing for the autoregressive process, it produces efficient

estimators over the single-equation methods. Second, the estimation also allows for heterogeneous fixed effect, heterogeneous trend effects and heterogeneity in lag structure across the panel members. Third, the SURADF test allows us identify how many and which member(s) of the panel contain a unit root. As this test has nonstandard distributions, the critical values of the SURADF test must be obtained through simulations.

With respect to Monte Carlo simulations, the intercepts, the coefficients on the lagged values for each series are set equal to zero. Importantly, the lagged differences and the covariances matrix are obtained from the SUR estimation on the actual 10 Asian countries data. The SURADF test statistic for each of the 10 countries series is computed as the t-statistic calculated individually for the coefficient on the lagged level. Since the SURADF estimation takes into account error correlation, which will be different for different series, the critical values for SURADF will be different for each series. In order to obtain the critical values, the experiments are replicated 10 000 times and the critical values of 1, 5 and 10% are tailored to each of the 10 panel member countries.

3. Results and Discussion

3.1. Univariate Unit Root. The analysis commences with the univariate unit root tests and proceedes to panel unit root and SURADF test. All the results point to the fact that the series under observation are stationary in their first difference form for all the tests carried out[7].

3.2. Panel Unit Root. The results are illustrated in Tables 1 and 2 for the case of Chinese Yuan and Japanese Yen, respectively. Once again, the entire test clearly indicates that the exchange rate series under investigation are non-stationary in its level form for the Chinese Yuan case (Table 1). The results indirectly suggest that the PPP theory does not hold for the Chinese Yuan. Different explanations can be derived from the results of Japanese Yen, however (see Table 2). ADF-Fisher and PP-Fisher tests show that the exchange rate series are stationary in its level form for the post-crisis period, a weak support for PPP.

Table 1. **Panel Unit Root Tests Results (Yuan)**

	Sample: 2001M1 –2006M11			
	Level		1st Difference	
	(μ)	(τ)	(μ)	(τ)
Breitung t-stat	2.198 (0.986)	N.A.	-12.059 (0.000)*	N.A.
Im, Pesaran & Shin W-stat	4.032 (1.000)	3.805 (0.999)	-12.2996 (0.000)*	-15.9038 (0.000)*
ADF-Fisher chi-square	7.184 (0.996)	9.586 (0.975)	182.924 (0.000)*	224.467 (0.000)*
PP-Fisher chi-square	6.050 (0.999)	9.564 (0.976)	252.502 (0.000)*	227.187 (0.000)*
Levin, Lin and Chu	3.004 (0.999)	2.815 (0.998)	-7.96317 (0.000)*	-11.9813 (0.000)*
Hadri Z-stat	17.840 (0.000)*	15.301 (0.000)*	-1.47199 (0.930)	0.63551 (0.263)

Notes: The Asian countries' currencies against Yuan are grouped into one panel with sample N=10, T=71. Figures in ( ) indicate the values are the probability of rejection while ( ) and ( ) indicate the models that allow for a drift term and both drift and deterministic trend, respectively. The PP-Fisher chi-square, PP-Choi Z-stat and Hadri Z-stat use the Newey-West bandwidth selection Bartlett kernel. Probabilities for the ADF-

[7] Full results are made available upon request from the first author.

Fisher and PP-Fisher tests are computed using an asymptotic 2 distribution while the other test follows the asymptotic normal distribution. N.A. stands for Not Applicable.

Table 2. **Panel Unit Root Tests Results (Yen)**

	Full Sample: 1981M1 – 2006M11			
	Level		1st Difference	
	(μ)	(τ)	(μ)	(τ)
Breitung t-stat	2.902 (0.998)	N.A.	-16.751 (0.000)*	N.A.
Im, Pesaran & Shin W-stat	2.825 (0.997)	2.883 (0.998)	-21.081 (0.000)*	-25.216 (0.000)*
ADF-Fisher chi-square	4.049 (0.999)	12.778 (0.887)	537.445 (0.000)*	534.510 (0.000)*
PP-Fisher chi-square	15.131 (0.768)	14.888 (0.782)	1369.64 (0.000)*	1526.07 (0.000)*
Levin, Lin and Chu	2.146 (0.984)	2.626 (0.995)	-16.206 (0.000)*	-25.726 (0.000)*
Hadri Z-stat	31.482 (0.000)*	32.873 (0.000)*	0.741 (0.229)	-1.461 (0.928)
	Pre-crisis: 1981M1 – 1997M6			
	Level		1st Difference	
	(μ)	(τ)	(μ)	(τ)
Breitung t-stat	3.332 (0.999)	N.A.	-13.844 (0.000)*	N.A.
Im, Pesaran & Shin W-stat	1.263 (0.896)	2.442 (0.992)	-16.878 (0.000)*	-14.025 (0.000)*
ADF-Fisher chi-square	8.356 (0.989)	10.546 (0.957)	345.116 (0.000)*	333.668 (0.000)*
PP-Fisher chi-square	12.781 (0.886)	10.247 (0.963)	830.760 (0.000)*	826.897 (0.000)*
Levin, Lin and Chu	0.927 (0.823)	1.118 (0.868)	-14.106 (0.000)*	-17.063 (0.000)*
Hadri Z-stat	31.005 (0.000)*	26.943 (0.000)*	0.612 (0.270)	-0.365 (0.642)
	Post-crisis: 1997M7 – 2006M10			
	Level		1st Difference	
	(μ)	(τ)	(μ)	(τ)
Breitung t-stat	0.727 (0.766)	N.A.	-10.519 (0.000)*	N.A.
Im, Pesaran & Shin W-stat	-1.260 (0.103)	-1.129 (0.129)	-11.836 (0.000)*	-11.653 (0.000)*
ADF-Fisher chi-square	39.329 (0.006)*	42.043 (0.002)*	460.998 (0.000)*	412.571 (0.000)*
PP-Fisher chi-square	40.817 (0.003)*	41.581 (0.003)*	695.821 (0.000)*	666.785 (0.000)*
Levin, Lin and Chu	-1.201 (0.114)	-0.365 (0.357)	-23.717 (0.000)*	-26.670 (0.000)*
Hadri Z-stat	23.211 (0.000)*	14.048 (0.000)*	0.808 (0.209)	-1.766 (0.961)

Notes: The Asian countries' currencies against Yen are grouped into one panel with sample N=10 and T=71, N=10 and T=198, N=10 and T=113 for full sample, precrisis period and postcrisis period respectively.

3.3. SURADF Evidence. Two previous tests provide rather uncertain results. The results of the univariate unit root testing are arguably low powered (see Liew et al., 2004) and up till now the results from the panel unit root tests are in qualm. On this, we proceed with the panel SURADF unit root test by Breuer et al. (2001, 2002) which

can provide less ambiguous picture (Tang and Lau, 2008) and can perform well with a mixed order of integration in the panel.

The results in Table 3 show that the currencies are unable to reject the null hypothesis of containing a unit root for all 10 Asian currencies. The test statistics of the currencies are obviously less than their critical values at 5% significance level. Thus, it also means that the 10 Asian currencies do not hold to the theory of PPP with Chinese Yuan.

Table 3. **SURADF Estimation Results for Yuan**

Country panel label	Test Statistics	Critical Values			Test Statistics	Critical Values		
	SURADF (Constant)	0.01	0.05	0.10	SURADF (Constant and trend)	0.01	0.05	0.10
Hong Kong	-1.747 (3)	-4.735	-3.984	-3.628	-2.101 (4)	-4.608	-3.942	-3.574
Indonesia	-1.607 (8)	-4.403	-3.714	-3.345	-2.019 (8)	-4.534	-3.867	-3.469
India	-2.048 (6)	-4.346	-3.624	-3.240	-2.297 (9)	-4.217	-3.481	-3.113
Korea	-2.972 (8)	-4.249	-3.574	-3.180	-3.058 (8)	-4.416	-3.791	-3.315
Myanmar	-2.701 (2)	-4.460	-3.767	-3.387	-2.618 (2)	-5.504	-4.914	-4.569
Malaysia	-2.175 (3)	-4.563	-3.813	-3.428	-2.500 (2)	-5.594	-4.934	-4.614
Pakistan	-2.402 (3)	-4.440	-3.695	-3.325	-2.267 (7)	-5.680	-5.011	-4.688
Philippines	-2.954 (5)	-4.448	-3.688	-3.302	-2.757 (7)	-5.216	-4.523	-4.188
Sri Lanka	-1.531 (6)	-4.138	-3.498	-3.147	-2.835 (4)	-5.228	-4.580	-4.255
Thailand	-2.858 (2)	-4.682	-4.006	-3.643	-2.846 (2)	-5.461	-4.896	-4.552

Notes: The column of SURADF refers to the estimated Augmented Dickey-Fuller statistics obtained through the SUR estimation of the RER-YUAN ADF regression. The 3 right-side columns reported the estimated critical values tailored by the simulation experiments based on 71 (2001M1 – 2006:M11) observations for each series and 10000 replications, following the work by Breuer et al. (2002). The error series are generated in such a manner to be normally distributed with the variance-covariance matrix given from the SUR estimation of the RER-YUAN panel structures. Each of the simulated RER series is then generated from the error series using the SUR estimated coefficients on the lagged differences. All the estimations and the calculation of the SURADF estimation are carried out in RATS 5.02 using the algorithm provided by Myles Wallace.

Splitting the results into 3 parts in Table 4 provides us a combination of the results. For the full sample period, results show that the Indonesian Rupiah, the Indian Rupee, the Philippines Peso, South Korean Won and Thai Baht's are stationary. The succession of null rejection elucidates the characteristics of the theory of PPP.

Whilst precrisis period, the results only show stationarity in the Philippines Peso against the Yen. The other 9 currencies (Hong Kong, India, Indonesia, Malaysia, Myanmar, Pakistan, South Korea, Sri Lanka and Thailand) fail to reject the unit root null, which also mean they are all non stationary.

On the other hand, during the post crisis period, India, Korea, Philippines and Thailand illustrate stationarity property supporting PPP. Meanwhile, Hong Kong, Indonesia, Myanmar, Malaysia, Pakistan and Sri Lanka are those who fail to show a stationary characteristic in the post crisis.

4. Conclusion. The purpose of this paper is to test the validity of the PPP hypothesis in 10 Asian countries with respect to Yuan and Yen as base. If the PPP hypothesis holds, it means that the studied currencies are moving on the same track which could be then further integrated. The results show that for the Yuan case, all the coun-

Table 4. **SURADF Estimation Results for Yen**

Country panel label	Test Statistics	Critical Values			Test Statistics	Critical Values		
	SURADF (Constant)	0.01	0.05	0.10	SURADF (Constant and trend)	0.01	0.05	0.10
	Full Sample: 1981 M1 – 2006 M11							
Hong Kong	-3.447(14)	-4.381	-3.783	-3.459	-3.441 (14)	-4.383	-3.767	-3.446
Indonesia	-4.529 (7)*	-4.253	-3.660	-3.351	-4.692 (7)*	-4.256	-3.667	-3.327
India	-8.768 (2)*	-3.906	-3.245	-2.921	-8.805 (2)*	-3.822	-3.202	-2.897
Korea	-4.721 (12)*	-4.715	-4.037	-3.703	-4.725 (12)*	-4.727	-4.055	-3.707
Myanmar	-4.659 (13)	-5.557	-4.983	-4.668	-4.672 (13)	-5.653	-5.013	-4.682
Malaysia	-3.483 (14)	-5.545	-4.986	-4.659	-3.682 (14)	-5.573	-4.966	-4.659
Pakistan	-4.364 (14)	-5.587	-5.033	-4.725	-3.856 (15)	-5.643	-5.070	-4.726
Philippines	-6.561 (9)*	-5.186	-4.619	-4.314	-10.260 (5)*	-5.256	-4.646	-4.315
Sri Lanka	-3.929 (16)	-5.310	-4.756	-4.450	-3.959 (16)	-5.345	-4.737	-4.422
Thailand	-6.286 (8)*	-5.594	-4.988	-4.688	-12.230 (12)*	-5.636	-5.043	-4.714
	Precrisis: 1981 M1 – 1997 M6							
Hong Kong	-2.623 (14)	-5.018	-4.366	-4.024	-3.664 (10)	-5.979	-5.414	-5.101
Indonesia	-2.415 (14)	-5.795	-5.219	-4.893	-2.951 (12)	-5.396	-4.822	-4.508
India	-2.135 (14)	-5.429	-4.821	-4.488	-3.595 (11)	-5.480	-4.914	-4.605
Korea	-2.275 (14)	-5.537	-4.990	-4.663	-2.447 (14)	-5.873	-5.289	-4.984
Myanmar	-3.651 (11)	-5.403	-4.812	-4.463	-2.993 (14)	-5.428	-4.813	-4.484
Malaysia	-2.955 (12)	-4.861	-4.244	-3.884	-2.561 (14)	-4.406	-3.565	-3.043
Pakistan	-3.645 (10)	-5.026	-4.342	-3.991	-3.547 (11)	-5.022	-4.350	-3.980
Philippines	-6.785 (5)*	-5.404	-4.804	-4.441	-7.054 (5)*	-5.451	-4.783	-4.425
Sri Lanka	-3.539 (12)	-5.009	-4.343	-4.000	-2.936 (14)	-4.953	-4.349	-4.026
Thailand	-3.220 (11)	-5.600	-4.955	-4.632	-3.323 (11)	-5.638	-5.001	-4.652
	Post crisis: 1997 M7 – 2006 M11							
Hong Kong	-2.812 (10)	-4.831	-4.192	-3.803	-2.923 (10)	-4.693	-3.893	-3.494
Indonesia	-2.230 (10)	-4.534	-3.879	-3.539	-2.691 (7)	-4.625	-3.957	-3.611
India	-5.912 (2)*	-4.070	-3.386	-3.025	-5.181 (2)*	-4.162	-3.408	-3.066
Korea	-8.910 (2)*	-5.773	-5.189	-4.884	-8.863 (2)*	-5.673	-5.089	-4.584
Myanmar	-4.103 (11)	-5.683	-5.002	-4.668	-4.107 (11)	-5.837	-5.195	-4.847
Malaysia	-2.332 (10)	-5.410	-4.765	-4.423	-2.379 (10)	-5.699	-4.994	-4.606

The End of *Table 4*

Country panel label	Test Statistics	Critical Values			Test Statistics	Critical Values		
	SURADF (Constant)	0.01	0.05	0.10	**SURADF (Constant and trend)**	0.01	0.05	0.10
Pakistan	-3.810 (12)	-5.798	-5.139	-4.801	-4.033(11)	-5.966	-5.307	-4.966
Philippines	-6.685(4)*	-5.350	-4.719	-4.387	-8.727 (2)*	-5.475	-4.854	-4.508
Sri Lanka	-4.079 (11)	-5.317	-4.710	-4.380	-3.917 (12)	-4.653	-4.549	-4.226
Thailand	-8.936 (2)*	-5.722	-5.085	-4.761	-8.974 (2)*	-5.922	-5.275	-4.909

Notes: The column of SURADF refers to the estimated Augmented Dickey-Fuller statistics obtained through the SUR estimation of the RER-YEN ADF regression. 3 right-side columns reported the estimated critical values tailored by the simulation experiments based on 312 (1981 M1 - 2006 M11), 187 (1981 M1 - 1997 M6) and 113 (1997 M7 - 2006 M11) observations respectively for each series and 10000 replications, following the work by Breuer et al. (2002). The error series are generated in such a manner to be normally distributed with the variance-covariance matrix given from the SUR estimation of the RIP-US panel structures. Each of the simulated RIP series is then generated from the error series using the SUR estimated coefficients on the lagged differences. Asterisk (*) denotes statistical significance at 0.05 level. All the estimations and calculations of the SURADF are carried out in RATS 5.02 using the algorithm provided by Myles & Wallace.

tries are found to be non-stationarity at their level form. For the Yen base, it can be safely concluded that there is weak evidence in favour of PPP. The results of this study much resemble Zhou (2008) findings that the Yen based real exchange rates provide mixture of the results in to various countries.

The 10 Asian countries' exchange rate trends are generally following the trend of the classic giant, Japan instead of the rising China. The region's union is aimed to reduce the region's dependence and subsequently able to compete at the global markets in the near future. Japan is the best example of a country that have less dependency on external markets and only affected slightly by the US economic imbalances as noted by (Mazier et al., 2007). We may suggest that the "Asian exchange rates trend" may still be influenced by the old time Asian giant, Japan. Albeit China could be growing economically, however, the countries seem to have more in common with the former. A deliberation of this could be well explained theoretically by the "Flying Geese" model by Akamatsu (1935).

An economic and monetary cohesion depends not only on convergence in real exchange rates among member countries but also on convergence of interest rates, inflation, government debt and deficits and even more comprehensive encounter of economic environment as a whole. Suggestion can still be made from this study since exchange rates convergence is one of the prerequisite for a successful monetary union. Monetary union is possible (similar results found in Rangkakulnuwat et. al., 2010) but with more cooperation and thorough supervision among all the member countries. It can be initiated with a few countries and then developed after a "real succession". Governments should have a more active role in evaluating countries performance and integrating better regional economics environment to develop a monetary union. The most important step is to start considering benefits of a union and stop worrying about individual countries' sentiments.

References

Akamatsu, K. (1935). Wagakuni yomo kogyohin no susei [Trend of Japanese Trade in Woollen Goods], Shogyo Keizai Ronso [Journal of Nagoya Higher Commercial School], 13, 129-212.

Baharumshah, A.Z., Chan, T.H. and Fountas, S. (2008). Re-examining Purchasing Power Parity for East-Asian Currencies: 1976-2002, Applied Financial Economics, 18, 75-85.

Baharumshah, A.Z., Haw, C.T., Masih, A.M.M. and Lau, E. (2011). Financial Integration of East Asian Economies: Evidence from Real Interest Parity, Applied Economics, 43, 1979 -1990.

Bissoondeeal, R.K. (2008). Post-Bretton Woods Evidence on PPP Under Different Exchange Rate Regimes, Applied Financial Economics, 18, 1481-1488.

Breitung, J. (2000). The local power of some unit root tests for panel data, in: Baltagi, B., Fomby, T.B., Hill, R.C. (Eds). Advances in Econometrics: Nonstationary Panels, Cointegration in Panels and Dynamics Panels, JAI Press: Stamford.

Breuer, J.B., McNown, R. and Wallace, M.S. (2001). Misleading Inferences from Panel Unit-Root Tests with an Illustration from Purchasing Power Parity, Review of International Economics, 9, 482-493.

Breuer, J.B., McNown, R. and Wallace, M.S. (2002). Series-Specific Unit Root Tests with Panel Data, Oxford Bulletin of Economics and Statistics, 64, 527-46.

Cassel, G. (1916). The Present Situation of the Foreign Exchanges, Economic Journal, 26, 62-65.

Culver, S.E. and Papell, D.H. (1999). Long Run PPP with Short-Run Data: Evidence with a Null Hypothesis of Stationary, Journal of International Money and Finance, 18, 751-768.

Dornbusch, R. (1987). Purchasing Power Parity, in: J. Eatwell, M. Migare and P. Newman (Eds). The New Palgrave Dictionary, Stockton Press: New York.

Elliott, G., Rothenberg, T.J. and Stock, J.H. (1996). Efficient Tests for an Autoregressive Unit Root, Econometrica, 64, 813-836.

Frankel, J. and Rose, A.K. (1996). A Panel Project on Purchasing Power Parity: Mean Reversion within and between Economies, Journal of International Economics, 40, 209-224.

Gil-Alana, L.A. (2000). Mean Reversion in the Real Exchange Rates, Economics Letters, 69, 285-288.

Hadri, K. (2000). Testing for Stationarity in Heterogenous Panel Data, Econometrics Journal, 3, 148-161.

Im, S., Pesaran, H. and Shin, Y. (2003). Testing for Unit Roots in Heterogeneous Panels, Journal of Econometrics, 115, 53-74.

Kalyoncu, H. and Kalyoncu, K. (2008). Purchasing Power Parity in OECD Countries: Evidence from Panel Unit Root, Economic Modeling, 25, 440-445.

Karlsson, S. and Lothgren, M. (2000). On the Power and Interpretation of Panel Unit Root Tests, Economics Letters, 66, 249-255.

Karras, G. (2005). Is There a Yen Optimum Currency Area? Evidence from 18 Asian and Pacific Economies, Japan and the World Economy, 17, 456-469.

Levin, A., Lin, C.F. and Chu, J. C. S. (2002). Unit root tests in panel data: asymptotic and finite-sample properties, Journal of Econometrics, 108, 1-24.

Liew, V.K.S., Baharumshah, A.Z. and Chong, T.T.L. (2004). Are Real Exchange Rates Stationary?, Economics Letters, 83, 313- 316.

Liew, V.K.S., Lee, H.A. and Lim, K.P. (2009). Purchasing Power Parity in Asian Economies: Further Evidence from Rank Tests for Cointegration, Applied Economics Letters, 16, 51-54.

Maddala, G.S. and Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test, Oxford Bulletin of Economics and Statistics, 61, 631-52.

Mazier, J., Oh, Y., and Saglio, S. (2007). Exchange Rates, Global Imbalances, and Interdependence in East Asia, Journal of Asian Economics, 19, 53-73.

Murray, C.J. and Papell, D.H. (2005). Do Panels Help Solve the Purchasing Power Parity Puzzle?, Journal of Business and Economic Statistics, 23, 410-415.

Narayan, P.K. (2005). New Evidence on Purchasing Power Parity from 18 OECD Countries, Applied Economics, 37, 1063-1071.

Narayan, P.K. (2006). Are Bilateral Real Exchange Rates Stationary? Evidence from Lagrange Multiplier Unit Root Tests for India, Applied Economics, 38, 63-70.

Narayan, P.K. (2008). The Purchasing Power Parity Revisited: New Evidence for 16 OECD Countries from Panel Unit Root Tests with Structural Breaks, Journal of International Financial Markets, Institutions and Money, 18, 137-146.

Ogawa, E. and Kawasaki, K. (2006). Adopting a common currency basket arrangement into the "ASEAN plus three", Research Institute of Economy, Trade and Industry (RIETI), Discussion Paper No. 06-E-028.

Ogawa, E. and Yang, D.Y. (2008). The Dilemma of Exchange Rates Arrangements in East Asia, Japan and the World Economy, 20, 217-235.

Ogawa, E. and Yoshimi, T. (2009). Analysis on β and σ convergences of East Asian currencies, Research Institute of Economy, Trade and Industry (RIETI), Discussion Paper No. 09-E-018.

Pontines, V. and Siregar, R. (2007). The Yen, The US Dollar, And The Trade Weighted Basket of Currencies: Does the Choice of Anchor Currencies Matter in Identifying Incidences of Speculative Attacks?, Japan and the World Economy, 19, 214-235.

Rangkakulnuwat, P., Ahn, S., Wang, H. and He, S. (2010). Extended Generalized Purchasing Power Parity and Optimum Currency Area in East Asian Countries, Applied Economics, 42, 497-513.

Rogoff, K. (1996). The Purchasing Power Parity Puzzle, Journal of Economic Literature, 34, 647-668.

Said, E. and Dickey, D.A. (1984). Testing for Unit Roots in Autoregressive Moving Average Models of Unknown Order, Biometrika, 71, 599-607.

Tang, T.C. and Lau, E. (2008). An Empirical Investigation on Sustainability of Balancing Item in Asian Countries, Applied Economics Letters, 15, 117-123.

Taylor, M. and Sarno, L. (1998). The Behavior of Real Exchange Rates During the Post-Bretton Woods Period, Journal of International Economics, 46, 281-312.

Wilson, P. and Choy, K.M. (2007). Prospects for Enhanced Exchange Rate Cooperation in East Asia: Some Preliminary Findings from Generalized PPP Theory, Applied Economics, 39, 981-995.

Zhou, S. (2008). Stationarity of Asian-Pacific Real Exchange Rates, Economics Letters, 98, 16-22.

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