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Exchange Rate Linkages between the ASEAN Currencies, the US Dollar and the Chinese RMB

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EXCHANGE RATE LINKAGES BETWEEN THE ASEAN CURRENCIES, THE US DOLLAR AND THE CHINESE RMB

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Abstract

This paper investigates whether the RMB is in the process of replacing the US dollar as the anchor currency in nine ASEAN countries, and also the linkages between the ASEAN currencies and a regional currency unit. A long-memory (fractional integration) model allowing for endogenously determined structural breaks is estimated for these purposes (Gil-Alana, 2008). The results suggest that the ASEAN currencies are much more interlinked than previously thought, whether or not breaks are taken into account, which provides support for a regional currency index as an anchor. Moreover, incorporating a break shows that the linkages between these currencies and the RMB and the US dollar respectively are equally important, and in fact in recent years the former have become stronger than the latter. Therefore including the RMB in the regional index should be considered.

Keywords: ASEAN currencies, Chinese RMB, US dollar peg, fractional integration, breaks

JEL classification: F31, C22

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Given the gradual decline of the US dollar and the simultaneous rise of the RMB as the dominant currency in the foreign exchange markets, as well as the increasingly strong economic linkages between the ASEAN region and China, one would expect the currencies of these countries to follow more closely the fluctuations of the RMB. Indeed, recent studies have found that the latter has acquired an increasingly important role in driving the region's currencies (e.g., Chen et al., 2010; Henning, 2012; Fratzscher and Mehl, 2014), or have even suggested that a RMB bloc has already been formed (e.g., Subramanian and Kessler, 2012).

The present paper investigates exchange rate linkages between the currencies of the ASEET EMC /P <</MCID 1;2 622

2005.[4] In the present paper we consider the PPP-based real exchange rate of the ASEAN currencies vis-a-vis not only the US dollar but also the Chinese RMB to examine whether and to what extent they are now following the latter rather than the former. In addition, we are also interested in establishing whether they are linked instead to an ASEAN regional currency unit, since the issue of a regional currency in Asia has been widely discussed recently; for instance Girardin (2011) found evidence for basket pegs in Asia with a predominant role for an Asian Currency Unit.

Third, parameter or regime shifts are known to affect many currencies (Frankel and Xie, 2010). Hence, it is important to allow for the possibility of structural breaks in the time period under investigation. For this purpose, we use the method proposed by Gil-Alana (2008) that allows for structural breaks within a fractional integration framework, with the number of breaks and the break dates being determined endogenously.

Our analysis provides valuable information to policy makers on the exchange rates linkages of the ASEAN currencies vis-à-vis the RMB and the US dollar and on which of the two would be more

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2. Methodology

The approach taken in this study is based on the concept of fractional integration, which allows the differencing parameter d required to make a series stationary I(0) to be any real value including fractions. Specifically, a time series is defined to be I(d) if it can be represented as

$$(1 - L)^d x_t = u_t, \quad t = 1, 2, \ldots, \qquad (1)$$

with $x_t = 0$, $t \leq 0$, where u_t is an I(0) process, defined as a covariance stationary process with a spectral density function that is positive and finite, and L is the backward shift operator ($Lx_t = x_{t-1}$). If d is not an integer, the series x_t requires fractional differencing in

it is valid even in non-stationary contexts (i.e., $d \geq 0.5$) and hence does not require prior differencing, unlike all other procedures (Sowell, 1992, Beran, 1995; Robinson, 1995; etc.); third, it is the most efficient in the Pitman sense against local departures from the null, with the limit distribution being a standard normal. Other, more standard parametric methods (Sowell, 1992, Beran, 1995) produced essentially the same results. The semi-parametric approach is a "local" Whittle method initially developed by Robinson (1995) and later extended by Phillips and Shimotsu (2004, 2005), Abadir et al. (2007) and others.

Fractional integration has been widely applied to the exchange rates of developed countries (e.g., Caporale and Gil-Alana, 2004). More recently, it has also been employed in the case of the Latin America and African countries (e.g., Caporale and Gil-Alana, 2010, 2013, 2015 and Balparda et al., 2016). However, very few papers have applied long-memory or fractional integration methods to the exchange rates of the

3. Empirical results

Data Description

The series analysed are the monthly real exchange rates of nine ASEAN countries (Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Philippine, Singapore, Thailand, and Vietnam) covering the period 1995m1-2014m12. There are three sets of exchange rates. The first includes those vis-à-vis the US dollar, obtained by adjusting the nominal exchange rates of the ASEAN currencies vis-a-vis the US dollar by the relative CPI between the ASEAN countries and the US. The second are calculated in a similar way, but replacing the US dollar with the RMB and the US CPt ! ¸ US C ß

intervals of the non-rejection values of d with the tests of Robinson (1994). Table 1 shows the results based on white noise errors and Table 2 those with autocorrelated disturbances.

Indonesia, Malaysia and Vietnam turn out to be the only ones offering evidence of a random walk; finally, in the case of the exchange rates vis-à-vis the RMB, there is evidence of a unit root for those of Brunei, Cambodia, Indonesia, Malaysia and Singapore, whilst for the remaining series the estimated value of d is found to be statistically significant and higher than 1.

[Insert Table 2 about here]

When still using a parametric method, but assuming that the errors are autocorrelated and following the exponential approach of Bloomfield (1973),[6] the estimated values of d are smaller than in the case of white noise u_t, being either within the unit root interval or smaller than 1. The latter implies that shocks have only transitory effects and mean reversion occurs; this holds in four cases when using the regional index to construct the real exchange rates (Indonesia, Laos, Malaysia and Philippines), two when considering the rates vis-à-vis the US dollar (Indonesia and Thailand), and one (Indonesia) for the exchange rates vis-à-vis the RMB.

[Insert Table 3 about here]

Table 3 reports the results for the semi-parametric "local" Whittle method of

the break dates are found to be the same as when using the Bai and Perron's (2003) method (except in a few cases when they differ by a single month).[8]

[Insert Tables 9 and 10 about here]

When assuming white noise errors (Table 9), only in Malaysia there is a significant difference between the first and the second subsamples, and no evidence of mean reversion is found, except in the first subsample in Vietnam. By contrast, in the case of autocorrelated disturbances (Table 10), some interesting results emerge. First, the estimated values of d are either unity or smaller than 1. Second, consistently with the previous findings, the strongest evidence of mean reversion is found for the exchange rates of the ASEAN currencies vis-à-vis the regional index: this holds for all of them except Brunei, in two cases (Malaysia and Thailand) in both sub-periods, in three (Lao, Philippines and Vietnam) before the break and in three (Cambodia, Indonesia and Singapore) after the break. In the case of Lao and Thailand, there are significant differences between the first and the second subsamples, again confirming the importance of allowing for breaks. By comparison, in the case of the ASEAN rates vis-à-vis the USD, only for six currencies (Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand) we find d <.cant EMC /P <</MCID 3244.49C BT1 0 0 1 234.77 318.65 Tm[ )]TJE

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Table 1: Estimates of d based on white noise errors

i) ASEAN currencies vis-a-vis the regional index			
Country	No regressors	An intercept	A linear time trend
BRUNEI	0.99 (0.90, 1.10)	**1.15 (1.05, 1.28)**	1.15 (1.05, 1.28)
CAMBODIA	0.98 (0.90, 1.09)	**1.07 (0.97, 1.20)**	1.07 (0.97, 1.20)
INDONESIA	0.98 (0.90, 1.09)	**1.00 (0.89, 1.15)**	1.00 (0.89, 1.15)
LAO P. DEM. R.	0.98 (0.88, 1.10)	**1.02 (0.82, 1.29)**	1.02 (0.82, 1.29)
MALAYSIA	1.01 (0.92, 1.12)	**1.02 (0.89, 1.19)**	1.02 (0.89, 1.19)
PHILLIPPINES	1.01 (0.92, 1.12)	**1.09 (0.98, 1.25)**	1.09 (0.98, 1.25)
SINGAPORE	1.01 (0.93, 1.12)	**1.19 (1.08, 1.32)**	1.19 (1.08, 1.32)
THAILAND	0.98 (0.90, 1.09)	**1.00 (0.89, 1.13)**	1.00 (0.89, 1.13)
VIETNAM	1.01 (0.92, 1.12)	**1.16 (1.06, 1.29)**	1.17 (1.06, 1.29)
ii) ASEAN currencies vis-a-vis the US dollar			
Country	No regressors	An intercept	A linear time trend
BRUNEI	0.98 (0.90, 1.08)	**1.10 (1.01, 1.24)**	1.10 (1.01, 1.24)
CAMBODIA	0.99 (0.91, 1.09)	**1.13 (1.05, 1.24)**	1.13 (1.05, 1.24)
INDONESIA	0.96 (0.87, 1.09)	**0.95 (0.85, 1.09)**	0.95 (0.85, 1.09)

Table 2: Estimates of d based on autocorrelated errors

i) ASEAN currencies vis-a-vis the regional index			
Country	No regressors	An intercept	A linear time trend
BRUNEI	0.94 (0.79, 1.12)	**0.94 (0.78, 1.13)**	0.94 (0.78, 1.13)
CAMBODIA	0.90 (0.78, 1.07)	**0.85 (0.69, 1.03)**	0.85 (0.71, 1.03)
INDONESIA	0.92 (0.79, 1.08)	**0.75 (0.60, 0.94)**	0.75 (0.60, 0.94)
LAO P. DEM. R.	0.82 (0.72, 0.96)	**0.48 (0.40, 0.58)**	0.32 (0.19, 0.49)
MALAYSIA	0.92 (0.79, 1.10)	**0.64 (0.52, 0.78)**	0.63 (0.48, 0.78)
PHILLIPPINES	0.95 (0.82, 1.15)	**0.83 (0.72, 0.99)**	0.83 (0.72, 0.99)
SINGAPORE	0.96 (0.81, 1.16)	**0.90 (0.75, 1.10)**	0.90 (0.75, 1.10)
THAILAND	0.95 (0.81, 1.13)	**0.88 (0.68, 1.16)**	0.88 (0.68, 1.16)
VIETNAM	0.93 (0.80, 1.12)	**0.96 (0.85, 1.11)**	0.96 (0.85, 1.11)

ii) ASEAN currencies

Table 4: Testing for a single break with Bai and Perron (1998, 2003) tests

	Vis-a-vis Regional Index	Vis-a-vis USD	Vis-a-vis

Table 7: Estimates for the ASEAN currencies vis-a-vis the US dollar

Country	Breaks	Subsamples	d
BRUNEI	4	1995M01 - 1997M12	1.35 (1.10, 1.77)
		1998M01 - 2001M01	1.10 (0.62, 1.76)
		2001M02 - 2006M09	1.01 (0.70, 1.40)
		2006M10 - 2010M07	0.96 (0.59, 1.31)
		2010M08 - 2014M12	1.09 (0.84, 1.49)
CAMBODIA	5	1995M01 - 1997M12	0.93 (0.71, 1.22)
		1998M01 - 2000M12	

PHILLIPPINES	5	1995M01 - 1997M12	1.45 (1.25, 1.77)
		1998M01 - 2000M12	1.61 (1.15, 2.22)
		2001M01 - 2004M10	0.85 (0.63, 1.34)
		2004M11 - 2007M10	1.49 (0.77, 2.31)
		2007M11 - 2010M10	1.13 (0.82, 1.70)
		2010M11 - 2014M12	1.08 (0.87, 1.39)

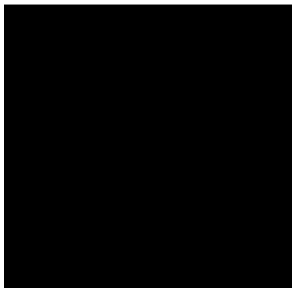

Table 9: Estimates of d for the two subsamples using Gil-Alana (2008) and white noise u_t

	Vis-a-vis Reg. index	Vis-a-vis USD	Vis-a-vis RMB
Brunei 1st subsample	1.18 (1.05, 1.35)	1.47 (1.15, 2.01)	[illegible]

Table 10: Estimates of d for the two subsamples using Gil-Alana (2008) and autocorr. u_t

	Vis-a-vis Reg.	Vis-a-vis USD	Vis-a-vis RMB
Brunei 1st subsample	0.91 (0.70, 1.18)	0.82 (0.02, 1.44)	0.44 (-0.14, 1.06)
Brunei 2nd subsample	0.73 (0.45, 1.17)	0.85 (0.75, 0.99)*	0.68 (0.57, 0.82)*
Cambodia 1st subsample	-0.13 (-1.07, 1.47)	1.11 (0.95, 1.34)	0.49 (