Uluslararası Sosyal Araştırmalar Dergisi
The Journal of International Social Research
Volume: 3 Issue: 14 Fall 2010

REAL INTEREST RATE PARITY HYPOTHESIS: EVIDENCE FROM MALAYSIA AND THAILAND

Tamat SARMIDI*
Mustafa CAGLAYAN**

Abstract

Employing cointegration test that allow for structural breaks in the cointegrating vector, we test for the real interest rate parity hypothesis for Malaysia and Thailand using US as the base country over 1990:01-2006:12. We capture effect of the East Asian economic crisis and find evidence in support of real interest rate convergence for Thailand but not for Malaysia.

Key Words: Real Interest Rate, East Asian Crisis, Cointegration, Structural Break

1. Introduction

In this paper, allowing for structural breaks, we seek to find out whether the real interest rates between the US and two East Asian developing countries, Malaysia and Thailand, tend to converge over the period 1990–2006.[1] This may be of interest to policy makers as Malaysia and Thailand implemented different policy measures to cushion the adverse impact of the 1997 Asian crisis.

The real interest rate parity hypothesis (RIPH) states that if economic agents are rational, there are no economic barriers between countries or no differential tax treatment in goods and asset markets, then the real interest rates between countries will equalize. Several researchers have investigated the prevalence of RIPH, including Mark (1985), Chinn and Frankel (1995), Phylaktis (1997) and Wu and Chen (1998). Contrary to its widespread theoretical use, empirical tests of RIPH reject the predicted relation between interest rate differential and exchange rate changes. Some of the explanations offered for the rejection include: expectational errors (Mark and Wu, 1998; Kirikos, 2002), the presence of time-varying risk premia (Francis *et al*. 2002; Sarantis, 2006), or policy behaviour (McCallum, 1994; Christensen 2000; Chinn and Meredith, 2004).

In real fact, all of the above-mentioned studies concentrate on developed and industrialized economies. Given the current status of liberalization in emerging markets (Levy-Yeyati and Sturzenegger 2005, and Chinn and Ito, 2005) and their growing importance in global financial markets (Bekaert and Harvey, 2003; Stiglitz, 2004), in this paper we re-examine RIPH for emerging economies focusing on two different economies that took different approaches to overcome the impact of financial crisis in 1997.

For the case of emerging markets, Anoruo et al. (2002) report that the interest rates of Asian countries are cointegrated and the relationship has strengthened in the 1990's. Recently, Baharumshah et al. (2005) tests the real interest differentials in ten Asian economies using Japan as the base country using

*• Corresponding author. Lecturer, School of Economics, Universiti Kebangsaan Malaysia,
** Professor in Economics at the Department of Economics, The University Of Sheffield, UK.
[1] Choice of base country is due to the fact that Malaysia and Thailand generally use US Dollar for the final settlement of their net balance of trade.

various types of panel cointegration techniques. The result shows that real interest rate parity holds strongly between Japan and Asian emerging markets.

The next section briefly lays out the theory, the model and then the empirical findings. Last section concludes the paper.

2. Theory and Methodology

Assuming that uncovered interest rate parity (UIP), purchasing power party (PPP) and ex-ante Fisher conditions hold, we can present RIPH as:

(1)

where *r, i, s*, and π denote the real interest rate, nominal interest rate, nominal exchange rate and inflation rate, respectively. Starred terms represent base country variables and Δ is the difference operator. The first set of parenthesized terms in equation (1) denotes the deviation from the UIP and the second set portrays the deviation from the PPP. Next, we rewrite equation (1) as follows to test for RIPH:[2]

$$r_t = \alpha + \beta r_t^* + \varepsilon_t \quad (2)$$

Given that capital is mobile and there are no country specific barriers between the home and the base countries, real interest rate equalization would imply that $r = r^*$ while ε_t is stationary. The prediction that $\alpha = 0$ and $\beta = 1$ is referred to as strong form RIPH. However, it is also possible to find $\alpha \neq 0$ and $\beta \neq 1$; referred to as weak form RIPH. The evidence of RIPH also indicates incompatibility of three open macroeconomic objectives i.e. monetary independence, capital market openness and exchange rate stability to co-exist together at the same time without scarifying at least one of them (see for example Obstfeld et al. (2004)).

Since Malaysia and Thailand had to go through major fiscal and monetary policy changes due to 1997 Asian crises, the analysis of RIPH for these two countries must allow for the presence of a structural break in the cointegrating vector. Previous study in the area of RIPH for emerging markets does not consider market disturbances that could cause to structural breaks in the time series modeling. Here, we employ an approach proposed by Gregory and Hansen (1996), henceforth GH, which allows the data to endogenously determine the timing of the regime shift. GH considers three possibilities as regime shift can affect the intercept or the slope, and whether a trend could be included in the cointegrating regression. These alternative models are

$$r_t = \alpha_1 + \alpha_2 D_{t\tau} + \beta r_t^* + \varepsilon_t$$

t = 1, ..., n (3)

$$r_t = \alpha_1 + \alpha_2 D_{t\tau} + \beta r_t^* + \gamma t + \varepsilon_t$$

t = 1, ..., n (4)

$$r_t = \alpha_1 + \alpha_2 D_{t\tau} + \beta_1 r_t^* + \beta_2 r_t^* D_{t\tau} + \varepsilon_t$$

t = 1, ..., n (5)

[2] Equation (2) and its variants have been used in the literature, for instance also see Cumby and Mishkin (1986), Fountas and Wu, (1999) and Hallwood and MacDonald (2000).

where, $D_{t\tau} = 0 \; if \; t \leq [n\tau]$ and $D_{t\tau} = 1$, otherwise. The dummy variable, $D_{t\tau}$ allows one to test for a structural change. The unknown parameter $\tau \in (0, 1)$ denotes the relative timing of the break point. As usual α and ß are the intercept and the slope coefficients, respectively, and γ captures the trend effects. Hence, to capture structural breaks that due to the impact of financial crisis that frequently occur along the way of liberalization process, we introduce a dummy in model (3) that allows for level shift, model (4) adds a linear trend to model (3) and model (5) allows for shifts in the level and the slope parameters.

3. Empirical Findings

To carry out the analysis, we extract monthly data from the International Financial Statistics (IFS) database covering the period between 1990–2006. We choose 1990 as the starting date of our analysis due to the timing of financial liberalization in Malaysia and Thailand. We construct the real interest rate by subtracting the ex-post inflation rate from the nominal interest rate—monthly inter-bank money rate. We present in Figure 1 the real interest rate series for Malaysia, Thailand and US along with the break point that is determined by the GH methodology. Interestingly, the break period happens to be roughly same for both countries. Considering that the crises happened late 1997 and the policy makers reacted early to mid 1998, the methodology detects the timing of the regime shift remarkably well.

We initially carry out several unit root tests (ADF, KPSS) including one that allows for an endogenously determined structural break in the data as suggested by Zivot and Andrews (1992). These tests indicate the presence of unit root in the series even after allowing for a shift in the mean or shifts in the mean and the trend[3].

Having established the presence of a unit root in the series, we proceed with the GH methodology to search for existence of a cointegrating relationship between the real interest rates allowing for an endogenously determined structural break. To test for cointegration between r_t and r_t* we use modified Z_α and Z_t statistics as Phillips (1987) suggests, and the ADF statistics as GH propose. We compute the above mentioned test statistics for each break point in the interval ([0.10n], [0.90n]) in search for the timing when α_2 (and β_2) will be significantly different from zero.[4]

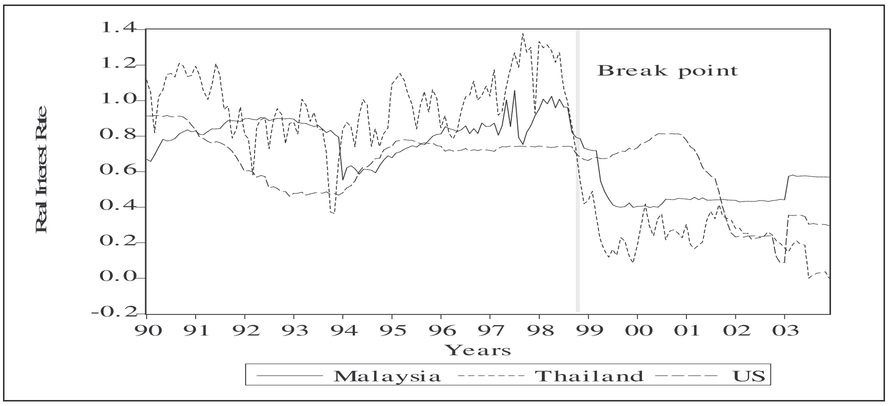

Figure 1: Real interest rate in Malaysia, Thailand and the US 1990:10 – 2006:12

Table 1 reports the results of the GH cointegration tests. Panel A exhibits no evidence in favor of cointegration between the US and Malaysian real interest rates while detecting the break point to be around 1998:10. Contrarily, panel B presents evidence that the null hypothesis of no cointegration for Thailand is rejected while pointing out a structural break around 1998:08 for model (4) and 1998:10 for models (3) and (5).

[3] Unit root tests results are available upon request.
[4] Asymptotic critical values for alternative models are provided in GH.

Table 1: Gregory-Hansen cointegratioon tests for Malaysia and Thailand 1990:1 – 2006:12

Model	Lag	ADF	Break	Z_t	Break	Z_α	Break
A-Malaysia							
C	0	-4.0439	0.52	-3.8698	0.52	-26.5027	0.52
DT	0	-4.2011	0.52	-4.0665	0.52	-29.4468	0.52
RS	0	-4.0482	0.52	-3.8745	0.52	-26.5443	0.52
B-Thailand							
C	0	-5.4059**	0.52	-5.4461**	0.52	-51.1863**	0.52
CT	0	-7.7321**	0.50	-5.7292**	0.50	-55.5478**	0.50
RS	0	-5.7583**	0.52	-6.0485**	0.52	-61.9934**	0.52

Note: ** and * imply significance at 1%, and 5% respectively. Model C is level shift, CT is level shift with a trend, and RS is regime shift. Critical values are taken from Gregory and Hansen (1996).

Having found the presence of a cointegrating relationship with a break for Thailand, we estimate the cointegration vectors using fully modified ordinary least square (FM-OLS) estimators of Phillips and Hansen (1990). The results are quite illustrative of the changes in the parameters of the equilibrium relationship pre– and post–crisis period as shown in Table 2. As the table depicts, there are significant changes both in the magnitude of the slope and in the intercept of the cointegration vector.

Table 2: FM-OLS Estimates of the Cointegrating Vectors pre– and post– break (1998:10) for Thailand

Regime	Constant	Slope
Prior to break	0.3791**	0.8702**
	(0.1069)	(0.1522)
Post break	0.1444*	0.2083*
	(0.0582)	(0.1014)

Note: ** and * imply significance at 1% and 5% respectively. The numbers in parenthesis are the standard errors.

We presume that the structural break, as captured by our model, is due to policy changes introduced by both governments to accommodate the financial crisis that happened in late 1997. To deal with the consequences of the crises Thailand was forced to embark on an IMF-designed-program, while Malaysian government took a different path y introducing sweeping controls on capital account transactions, pegged the Malaysian currency against US dollar at RM3.80 per US$, cut interest rate and embarked on a policy of reflection which against macroeconomics orthodoxy. Hence, we conjecture that results presented in Tables 1 and 2 reflect the differences in policies implemented by Malaysian and Thai governments.

Conclusion

Allowing the data to determine the presence of a structural break, we find evidence for weak form of RIPH between US and Thailand but not for Malaysia. Our results can be interpreted as a reflection of different policies each government has implemented. For instance, Thai policy makers were mainly following IMF based policy rules which might have imposed constraints over the use of monetary and fiscal policies. Contrarily, Malaysian policy makers introduced selective capital controls that may have led to violation of some or several underlying assumptions for RIPH. Furthermore, our results provide relevant information regarding the compatibility of three general macroeconomic objectives—monetary independence, capital market openness and exchange stability. Overall, our findings present evidence of RIPH for Thailand but not for Malaysia and the failure of incompatibility of “holy trinity” for Malaysia case.

REFERENCES

ANORUO, E., Ramchander, S.,and Thiewes, H.F. (2002). "International linkage of interest rates evidence from the emerging economies of Asia", *Global Finance Journal*, 13, 217–235.

BAHARUMSHAH, Ahmad Zubaidi, Chan Tze Haw and Stilianos Fountas (2005). "A panel study on real interest rate parity in East Asian countries: Pre- and post-liberalization era", *Global Finance Journal,* 16(1):69-85.

BEKAERT and Harvey (2003). Bekaert, Geert and Harvey, Campbell R. (2003). "Emerging markets finance", *Journal of Empirical Finance,* 10 (1-2), 3-56.

CHINN, M. D. and Frankel, J.A. (1995). "Who drives real interest rates around the Pacific Rim: The USA or Japan", *Journal of International Money and Finance*, 14, 801–821.

CHINN, Menzie D. and Ito, Hiro (2005). "What Matters for Financial Development? Capital Controls, Institutions, and Interactions", *NBER Working Paper IMF,* No. 11370.

CHINN, Menzie D. and Meredith, Guy (2004). "Monetary Policy and Long-Horizon Uncovered Interest Rate Parity", *IMF Staff Papers,* 51 (3).

CHRISTENSEN, Michael (2000). "Uncovered interest parity and policy behavior: new evidence", *Economics Letters,* 69 (1), 81-87.

CUMBY R. E. and Mishkin, M.S. (1986). "The international linkage of real interest rates: The European-US connection", *Journal of International Money and Finance*, 5, 5–23.

FOUNTAS, S., and Wu, J. (1999). "Testing for real interest rate convergence in European countries", *Scottish Journal of Political Economy*, 46, 158–174.

FRANCIS, Bill and Hasan, Iftekar, and Hunter, Delroy (2002). "Emerging market liberalization and the impact on uncovered interest rate parity", *Journal of International Money and Finance,* Volume 21 (6), 931-56.

GREGORY, A. and Hansen, B. (1996). "Residual–based test for cointegration in models with regime shifts", *Journal of Econometrics*, 70, 99–126.

HALLWOOD, C. and MacDonald, R. (2000). *International Money and Finance*, Oxford: Blackwell publishing.

KIRIKOS, Dimitris G. (2002). "Discrete policy interventions and rational forecast errors in foreign exchange markets: the uncovered interest parity hypothesis revisited", *International Journal of Finance & Economics,* 7 (4), 327-38.

LEVY-YEYATI, Eduardo and Sturzenegger, Federico (2005). "Classifying exchange rate regimes: Deeds vs. Words", *European Economic Review,* 49 (6), 1603-35.

MARK, N. (1985). "Some evidence on the international inequality of real interest rates", *Journal of International Money and Finance*, 4, 189–208.

MARK, Nelson C. and Wu, Yangru (1998). "Rethinking Deviations from Uncovered Interest Parity: The Role of Covariance Risk and Noise", *The Economic Journal,* 108 (451), 1686-706.

MCCALLUM, Bennett T. (1994). "A reconsideration of the uncovered interest parity relationship", *Journal of Monetary Economics,* 33 (1), 105-32.

OBSTFELD, M. and Shambaugh, J., and Taylor A., (2004). "Monetary sovereignty, exchange rate, and capital controls: The trilemma interwar period", *NBER WP No. 10393*.

PHILLIPS, P. C. B. (1987). "Time series regression with a unit root", *Econometrica*, 55, 277-301.

PHILLIPS, P. C. B. and Hansen B. E., (1990). "Statistical inference in instrumental variables regression with I(1) processes", *Review of Economic Studies*, 57, 99–125.

PHYLAKTIS, K. (1997). "Capital market integration in the Pacific Basin region: An analysis of real interest linkages", *Pacific-Basin Finance Journal*, 5, 195-213. 6.

SARANTIS, Nicholas (2006). "Testing the uncovered interest parity using traded volatility, a time-varying risk premium and heterogeneous expectations" , *Journal of International Money and Finance,* 25 (7), 1168-86.

STIGLITZ, Joseph E. (2004). "Globalization and growth in emerging markets", *Journal of Policy Modeling,* 26 (4), 465-84.

WU, J. L. and Chen, S.L. (1998). "A re-examination of real interest parity", *Canadian Journal of Economics*, 31, 837–851.

ZIVOT, E. D. and Andrews, W.K. (1992). "Further evidence on the great crash, the oil-price shock and the unit root hypothesis", *Journal of Business and Economic Statistics*, 10, 251–270. 7.