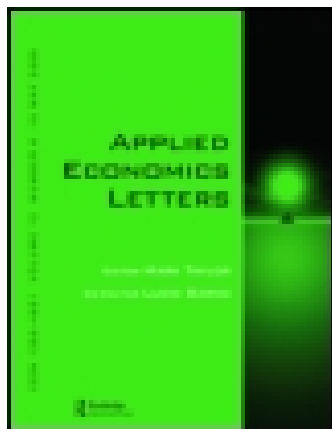


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Hedge funds, exchange rates and causality: evidence from Thailand and Malaysia

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This article contributes to the debate on hedge funds and exchange rates in Thailand and Malaysia. It provides the first empirical evidence on causal relation between hedge funds and exchange rates. Using a new Granger noncausality procedure proposed by Toda and Yamamoto (1995) and monthly data for the January 1994 to April 2002 period, two important findings emerge. First, hedge funds lead Thai baht during the 1997 crisis. Second, there is a bidirectional causality between hedge funds and Malaysian ringgit for the pre-crisis period. In all other cases, no causal relation can be established.

I. Introduction

In recent years, there has been a growing interest in the activity of leveraged institutions. This is due to the occurrence of several events linked to hedge funds such as, the attack on sterling in 1992, the global bond rally in 1993/1994, the Asian currency crisis in 1997, and the Long-Term Capital Management crisis. In the case of Asian countries, the interest has been fuelled by the 1997 financial crisis.

It has been widely recognized that the 1997 Asian financial crisis started in Thailand. Weak macro-economic conditions as indicated by high level of foreign debt and widening current account deficit exposed the economy to speculative attacks.¹ As a result, Thai baht lost 50% of its value against

major currencies in the second half of 1997. Instantaneously, the crisis spread to other countries in the region and resulted in massive currencies and stock prices depreciation. The hedge funds were soon criticized for selling short Asian currencies (Mohamed, 1997) and dealing in thin market with substantial volume (Reserve Bank of Australia, 1999). Countries like Thailand, Indonesia and South Korea were particularly vulnerable to the attack because of high level of short-term foreign liabilities.² Although, Malaysia and Philippines appeared to be in better shape, they were also affected due to their close economic ties with other countries in the region.

As a result of the crisis, few studies have assessed the link between hedge funds and

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¹ According to an interview with Stanley Drucker-miller (i.e. the former head of the Quantum Fund) there were short positions in the Thai *baht* and Malaysian *ringgit*. The Quantum's year-to-date returns climbed from 3.2% at the end of the first quarter to 22% as of 3 September 1997 (Wall Street Journal, 5 September 1997, p. C1).

² As of June 1997, the ratios of short-term liabilities to international reserves were 210.6, 162.9 and 141.1% for South Korea, Indonesia and Thailand, respectively.

the affected currencies. Using monthly data on 27 funds, Fung and Shieh (2000) observe that they had a sizeable gain in July 1997 when the Thai baht was devalued. However, they suggest that the gain was derived from the US equity market and not by selling Asian currencies.³ Based on a sample of 10 global funds, Brown *et al.*, (2000) find that the estimated exposure of the funds varied considerably during the crisis. However, there is no significant relationship between the estimated exposure and exchange rates. Eichengreen *et al.* (1998) argue that there is little evidence to believe that the funds are able to overwhelm a market than other larger traders such as commercial banks, investment banks, insurance companies and corporations. In addition, they find no evidence that the funds have used positive feedback trading strategies. Brealy and Kaplanis (2001), however, warn that the above findings should be interpreted with caution as the funds make frequent changes in their exposures. Instead, they suggest that the estimated coefficient should be interpreted as fund's average exposures over the estimation period. By and large, studies on the link between hedge funds and exchange rates remain limited, particularly in the context of causal relationship.

This article contributes to the literature on the relationship between hedge funds and exchange rates in three aspects. First, this study extends the literature by providing the first empirical evidence on causal relation between hedge funds and exchange rates. The existing studies focus mainly on estimating the individual fund's exposure on currencies. Second, this article use hedge funds data from five different sources to allow robust conclusion to be drawn. Third, this study utilizes a new methodology which allows causal inferences to be conducted in a system including time series processes that may be integrated as well as cointegrated. Toda and Yamamoto (1995) propose a useful approach that bypasses the need for potentially biased pre-tests for unit roots and cointegration.

The rest of the article is structured as follows. Section II discusses the data and empirical methodology. Section III presents the empirical results. Section IV concludes.

³ They also found that the funds exposure were significant during the ERM crisis in 1992, the global bond rally in 1993/1994. However, the funds exposures were insignificant during the stock market crash of 1987 and the Mexican peso crisis in 1994.

⁴ In the case of Malaysia, the post- August 1998 period is avoided due to the imposition of capital control which almost completely closed the financial market to foreigners.

⁵ For a complete description of these biases, refer to Fung and Shieh (2002).

⁶ The test has a comparable performance in size and power to the likelihood ratio (LR) and Wald tests (Zapata and Rambaldi, 1997).

⁷ Assuming 3-order VAR, where HF=hedge funds; EX=exchange rates.

II. Data and Methodology

Monthly observations for a sample from January 1994 to April 2002 are utilized.⁴ The pre-1994 period data is excluded due to measurement biases.⁵ The macro/global funds returns are used to represent hedge funds activity. The macro/global hedge funds are chosen because the nature of funds that take position on macroeconomic conditions by making leveraged bets on anticipated price movements in financial markets around the world. They are highly capitalized and normally use extensive leverage in their bets. The hedge funds data is taken from five sources, namely funds Investor Force Securities Inc. (IFS), Hedge Fund Research Inc. (HFR), Hennesse Group LLC. (HEN), Credit Suisse First Boston/Tremont Index LLC. (TRE) and Zurich Capital Market Inc. (ZUR). The end-of-month exchange rate data is expressed as domestic currency per unit of the US dollar and taken from the International Financial Statistic. The sample period is split into two sub-samples. The pre-crisis period covers from January 1994 to June 1997, during which the currencies were relatively stable. The crisis period continues from July 1997 to April 2002. This period was characterized by massive currencies depreciation.

In order to assess the causal relation between hedge funds and exchange rates, this study utilizes the approach proposed by Toda and Yamamoto (1995). This procedure uses the modified Wald (MWALD) test for testing linear restriction on the parameters of the first k lags in a VAR ($k + d_{\max}$) where k refers to lag length and d_{\max} is the maximum order of integration suspected to occur in the system.⁶

Following Toda and Yamamoto (1995) and Rambaldi and Doran (1996), these variables can be causally linked in a system as follows:⁷

$$\begin{bmatrix} \text{HF}_t \\ \text{EX}_t \end{bmatrix} = \alpha_0 + \alpha_1 \begin{bmatrix} \text{HF}_{t-1} \\ \text{EX}_{t-1} \end{bmatrix} + \alpha_2 \begin{bmatrix} \text{HF}_{t-2} \\ \text{EX}_{t-2} \end{bmatrix} + \alpha_3 \begin{bmatrix} \text{HF}_{t-3} \\ \text{EX}_{t-3} \end{bmatrix} + \alpha_4 \begin{bmatrix} \varepsilon_{\text{HF}} \\ \varepsilon_{\text{EX}} \end{bmatrix} \quad (1)$$

where α_0 is an identity matrix and $E(\varepsilon_t) = [\varepsilon_{\text{HF}}, \varepsilon_{\text{EX}}]' = 0$ and $E(\varepsilon_t \varepsilon_t') = \Sigma$. For example, if $k = 2$ and $d_{\max} = 1$, a causality from EX to HF can be established through rejecting the null hypothesis of

Table 1. Results of ARDL test for Thai baht

	HF indices				
	HEN	IFS	HFR	TRE	ZUR
Panel A: Pre-crisis period (January 1994 to June 1997)					
<i>F</i> -test	4.15	1.85	2.64	4.22	3.94
(<i>p</i> , <i>q</i>)	(1,1)	(1,1)	(1,1)	(1,1)	(1,1)
Panel B: Crisis period (July 1997 to April 2002)					
<i>F</i> -test	12.71*	16.94*	13.11*	14.69*	15.56*
(<i>p</i> , <i>q</i>)	(1,2)	(1,1)	(3,1)	(1,2)	(1,3)

Notes: Critical Bound's value at the 10% level – Lower: 4.04 and Upper: 4.78.

* indicate the rejection of null hypothesis at the 10% significant level.

EX_{t-1} and EX_{t-2} are jointly equal to zero in the first equation of the above system. A similar procedure can be used to test the causality from HF to EX by establishing a significance of the MWALD statistic for a group of lagged HF variables in the second equation of the system.

III. Empirical Results

Before examining the causal relationship between hedge funds and exchange rates, cointegration analysis is conducted using the Autoregressive distributed lag (ARDL) Bounds testing procedure (Pesaran *et al.*, 2001).⁸ The cointegrating relation is evaluated by means of *F*-statistic. If the *F*-statistic is greater than the upper band, the null hypothesis of noncointegration can be rejected, implying the existence of a long-run relationship. If the statistic falls below the lower band, the null cannot be rejected indicating noncointegration. However, if the *F*-statistic falls within the band, the test is inconclusive. The optimal lag selection is based on the Akaike information criterion. The results are presented in Tables 1 and 2 for baht and ringgit, respectively.

On the basis of the pre-crisis results obtained from the bounds testing, the null of noncointegration between hedge funds and Thai baht can not be rejected in all cases. However, results for the crisis period show that there exists a cointegrating relationship. The smallest *F*-statistic is 12.71, which is far greater than the upper critical bound.

In the case of ringgit, the pre-crisis results suggest that there is a cointegrating relationship between hedge funds and ringgit. In all cases, the null of noncointegration can be rejected at the 10% level,

indicated by the smallest *F*-statistic of 6.91. However, no cointegrating relationship can be established for the crisis sub-period as the *F*-statistics are too small to reject the null.

Next, the nature of causal linkages between hedge funds and exchange rates is examined by estimating system Equation 1 in the level form. The Akaike Information Criterion (AIC) and Schwarz Bayesian criterion (SBC) lag selection criteria are used to determine the optimal lag structure of the VAR system. In most cases, the lags suggested by AIC and SBC are the same. Due to the importance of serially uncorrelated residuals, higher lag is chosen whenever AIC and SBC suggest different lags. The test results are reported in Tables 3 and 4 for baht and ringgit, respectively.

Panels A and B report the results for pre-crisis and crisis periods, respectively. Based on the 10% significant level, the pre-crisis results shows no evidence of causality from hedge funds to baht. In all cases, the MWALD statistics are too small to reject the null. Moreover, there is no evidence of causality running from baht to hedge funds. However, a unidirectional causality from hedge funds to baht can be established for the crisis period. On four occasions, the null of noncausality can be rejected. The findings are suggestive that hedge funds Granger-cause Thai baht.

In Table 4, the pre-crisis results indicate that there is strong evidence of a bidirectional causality between hedge funds and ringgit. In four cases, the null of noncausality can be rejected at the 10% level. This implies that the funds activity contains useful predictive information on the ringgit movements. However, the results for crisis period show that no causal relation can be established. The MWALD statistic is too small to reject the null.

⁸Specifically, we estimate the following unrestricted error-correction model, $\Delta EX_t = \alpha_0 + \sum_{i=1}^p \beta_{1i} \Delta EX_{t-i} + \sum_{i=0}^q \beta_{2i} HF_{t-i} + \delta_1 EX_{t-1} + \delta_2 HF_{t-1} + \varepsilon_t$, where ε_t is a random error and Δ is a first difference operators.

Table 2. Results of ARDL test for Malaysian ringgit

	HF indices				
	HEN	IFS	HFR	TRE	ZUR
Panel A: Pre-crisis period (January 1994 to June 1997)					
<i>F</i> -test	6.91*	7.66*	8.11*	7.56*	8.05*
(<i>p</i> , <i>q</i>)	(3,0)	(3,0)	(3,0)	(2,0)	(3,0)
Panel B: Crisis period (July 1997 to Aug 1998)					
<i>F</i> -test	1.64	2.60	1.87	1.37	3.24
(<i>p</i> , <i>q</i>)	(1,0)	(1,0)	(1,0)	(1,0)	(1,0)

Notes: Critical bound's value at the 10% level – Lower: 4.04 and Upper: 4.78.
* indicate the rejection of null hypothesis at the 10% significant level.

Table 3. Results of Granger non-causality test for Thai baht

	Null	HF indices					
		HEN	IFS	HFR	TRE	ZUR	
Panel A: Pre-crisis period (January 1994 to June 2007)							
	HF $-/- >$ THB	0.3254 (0.5683)	0.9569 (0.3279)	2.1255 (0.1448)	0.9141 (0.3390)	0.4121 (0.5208)	[1]
	THB $-/- >$ HF	0.9423 (0.3150)	1.1847 (0.1583)	0.2759 (0.6720)	0.2950 (0.6398)	0.4295 (0.5194)	[1]
Panel B: Crisis Period (July 1997 to April 2002)							
	HF $-/- >$ THB	9.0693* (0.0107)	5.3672* (0.0683)	3.5207* (0.0606)	2.6882 (0.1010)	5.0534* (0.0245)	[1]
	THB $-/- >$ HF	0.2546 (0.6739)	0.1284 (0.1351)	1.1933 (0.1559)	1.2058 (1.1534)	0.4736 (0.5296)	[1]

Notes: * indicate rejection of null hypothesis at the 10% significant level.
The ($-/- >$) indicate does not Granger-cause.
THB = Thai baht.

Table 4. Results of Granger noncausality test for Malaysian ringgit

	NULL	HF indices					
		HEN	IFS	HFR	TRE	ZUR	
Panel A: Pre-crisis period (January 1994 to June 1997)							
	HF $-/- >$ MYR	12.8937* (0.0003)	9.0464* (0.0026)	11.5756* (0.0006)	2.49104 (0.1145)	24.7525* (0.0000)	1
	MYR $-/- >$ HF	7.0385* (0.0034)	10.8499* (0.0023)	12.8474* (0.0005)	1.5483 (0.1582)	8.3920* (0.0032)	1
Panel B: Crisis period (July 1997 to August 1998)							
	HF $-/- >$ MYR	1.8081 (0.1787)	0.4663 (0.4946)	1.3927 (0.2379)	1.5880 (0.20761)	1.4931 (0.2217)	1
	MYR $-/- >$ HF	1.1948 (0.1734)	0.7562 (0.3284)	1.4867 (0.2186)	1.4893 (0.2284)	1.9022 (0.1664)	1

Notes: * indicate rejection of null hypothesis at the 10% significant level.
The ($-/- >$) indicate does not Granger-cause.
MYR = Malaysian ringgit.

IV. Conclusions

This study contributes to the debate on hedge funds and exchange rates in Thailand and Malaysia. Monthly observations are utilized for a sample period from 1994 to 2001. Two sub-sample periods are created to better understand the issue, namely the

pre-crisis period (January 1994 to June 1997) and the crisis period (July 1997 to April 2002). A new Granger noncausality procedure by Toda and Yamamoto (1995) is utilized. Among the findings of interest is that the hedge funds is found to Granger-cause baht during the crisis. However, there is no evidence that the funds Granger-cause ringgit during the same

period and thus suggesting that the funds have no significant influence on the movement of ringgit. However, the findings for pre-crisis period suggest that there is a bidirectional causal relation only in the case of ringgit.

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