Is the Asian Crisis anticipatory? Evidence from Indonesia, Malaysia, South Korea and Thailand

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1 Introduction

There are at least two views of what had caused the 1997 currency crisis in East Asia. The first view emphasizes the weaknesses in the micro- and macro-economic fundamentals of these economies. According to this view, the Asian currency crisis is bound to happen and the question is just when. The second view emphasizes liquidity problem. These countries had insufficient reserves and insufficient access to funds. Once foreign bankers refused to roll over their short-term debt, the ensuing liquidity problem then triggered a self-fulfilling crisis similar to a bank run.[1]

Of course, these two views are not mutually exclusive. Countries with weak fundamentals might increase the likelihood of a liquidity problem. Radelet and Sachs (1998) investigate the contribution to the crisis of various factors related to these two views and find that no single one is adequate in explaining the occurrence of the crisis. The finding, that no single factor alone can explain the crisis, suggests that the currency peg of the Asian countries might have been credible before the crisis. Indeed, Furman and Stiglitz (1998) examine several models using pooled time series data and find no evidence that the crisis were predictable.

In this paper, using the analytical framework of target zone models, we infer from financial market data the operating properties and credibility of the pre-crisis pegged exchange rate arrangements of Thailand, Malaysia, Indonesia, and Korea, the four countries that were most badly hit during the crisis. More precisely, based on the predictions of theoretical target zone models, we extract from financial market data

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[1] For a discussion of these two views and other views, see the summary reports on the various meetings of the NBER project on Exchange Rate Crises in Emerging Markets (http://www.nber.org/crisis/). Also see Radelet and Sachs (1998), Furman and Stiglitz (1998), Moreno et al. (1998), and Corsetti et al. (1999) for detailed analyses.

the de facto characteristics (e.g., whether it is a managed float or a proper target zone) of these countries' pegged exchange rate arrangements. We also recover the market's realignment expectations of the four exchange rates and relate them to some of the fundamental macroeconomic factors suggested in the literature. The investigation of which factors might have influenced credibility sheds light on how one might predict and prevent future crises. Our empirical framework allows us to uncover country-specific factors that might have affected the credibility of the pegs. Most previous studies on the predictability of crises (e.g., Furman and Stiglitz, 1998) use pooled time-series data because crises are by definition rare. The disadvantage of using pooled time series data is that one is forced to assume that countries are more or less the same which rules out the possibility of country-specific experience. Our approach allows us to investigate the factors affecting the credibility *by country* and hence allows us to uncover factors that might have an effect, say, on Thailand's peg credibility but not on Korea's. Indeed, our results indicate that the pegged exchange rate arrangements and factors affecting credibility do differ across countries, and that predictable fundamental weaknesses are pivotal in explaining the crises in Thailand, Indonesia, and Korea, but otherwise play little role in the Malaysian case.

The remaining of the paper is organized as follows. In section 2, we give a brief review of the official exchange policies of the four countries. In section 3, we give an overview of our empirical framework. In section 4, we report and interpret the empirical results by countries. Section 5 concludes.

2 Exchange rate institutional summary

Officially, Thai baht was pegged to an unpublished basket of currencies since 1984. Because there had been little fluctuation in the baht-US dollar exchange rate despite large fluctuation of the dollar against other currencies, it had been suspected that the US dollar might have carried a weight as high as 88% (Williamson, 1996). It is known that the Thai central bank limited the fluctuation of the baht within a narrow band. According to Alba et al. (1999), it appeared that a narrow band had been targeted since 1987. It had been reported that the baht's swing against the dollar was limited to less than 1% on either side of the 25.25 baht per US dollar average exchange rate. The data from 1987 to 1997 suggest that the Thai Baht fluctuated within a very narrow band of ±3 percent around its mean – 25.4 baht per US dollar.

Although Indonesia described its exchange rate system as managed float, it seemed to practice crawling peg since 1986. The rupiah was allowed to depreciate at an average rate of 5% with a narrow intervention band (e.g., United Nations, 1997). Although we do not have data on the intervention band (esp. for the early years), the intervention band has known to be widened a few years before the crisis -- from ±4% in 1995 to ±8% in 1996 and ±12% to 1997 (Williamson, 1996, and United Nations, 1997).

In the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* since 1991, Malaysia had reported that its currency's (ringgit) value was determined by market supply and demand and will intervene only to "maintain orderly market conditions and to avoid excessive fluctuations in the value of the ringgit in terms of Malaysia's trading partners and the currencies of settlement." However, its currency fluctuated within a narrow band. The stable ringgit value might have been due to the central bank's intervention activity or the restrictions on exchange market, which were aimed at reducing speculative inflows in 1989 and 1992 (United Nations, 1997).

Korea described its exchange rate system as a "market average rate system." This means it allows its currency (won) to fluctuate within a band of ±2.25% around a central parity on any day, but today's central parity is based on yesterday's weighted average interbank spot rate. The Bank of Korea stood ready to intervene in the currency market whenever the rate falls on or out of this band (Williams, 1996).

In short, these four Asian countries seemed to follow a target zone exchange rate regime. The summary statistics in Table 1 confirms this conclusion. Table 1 reports the percentage deviation of exchange rate from central parity. The widths of the bands (i.e., range) are all less than 8% and ranges from 5.393% (Malaysia) to 7.884% (Korea). These widths are comparable to those of the European Monetary System. Thus, target zone model seems reasonable to describe the exchange rate regime for the four Asian countries.

3 Empirical framework

3.1 Measuring realignment expectations

Let s(t) be the (log) exchange rate. As an identity, s(t) can be decomposed into two components: s(t) $\equiv$ c(t) + x(t), where c(t) is the (log) central parity rate and x(t) is the log deviation of the exchange rate from central parity. Subject to the intervention of the central bank, the movement of x(t) is bounded within a band around the central parity. It follows from the decomposition that

$$E_t[ds/dt] = E_t[dc/dt] + E_t[dx/dt] \qquad (3.1)$$

where E_t[.] is the conditional expectation operator, given information available at time t. The market's realignment expectations, E_t[dc/dt] $\equiv$ g(t), measure the credibility of the currency peg. If the peg is perfectly credible, the central parity is not expected to move and hence g(t) will be zero. A large positive value of g(t), on the contrary, reflects low credibility and the currency peg is expected to devaluate.

(3.1) is the basis of the *drift-adjustment method* (Bertola and Svensson, 1993) for recovering realignment expectations from observed data. By uncovered interest parity, the expected rate of total depreciation, E_t[ds/dt], is identified with the observed interest differentials between home and foreign currencies. Thus,

$$E_t[dc/dt] \equiv g(t) = i(t) - i^*(t) - E_t[dx/dt] \qquad (3.2)$$

where i(t) and i*(t) denote home and foreign interest rates respectively. (3.2) shows that g(t) can be recovered from the observed interest differentials, i(t) - i*(t), after subtracting an estimate of the expected drift within band E_t[dx/dt]. In practice the expected drift is estimated by the fitted value of the following projection equation in discrete time:

$$\frac{x(t+\tau)-x(t)}{\tau} = H(x(t)) + z(t)'\beta + \varepsilon(t+\tau) \tag{3.3}$$

where H(.) is a possibly nonlinear function as suggested by the theoretical target zone literature, and z(t) is a vector of state variables other than x(t).

Estimating (3.3) is not just an intermediate step towards the calculation of realignment expectations; it is of interest in its own right because the shape of the function H(.) carries valuable information about the credibility of the target zone and how it is maintained by the central bank. H(.) describes how market participants expect the exchange rate would behave when they observe its current position within the band. And these expectations, due to forward looking behavior, depend on when and how the central bank would intervene and how credible the central bank's resolve is in defending the target zone. It is known from the theoretical target zone literature that H(.) can take a wide variety of shapes, depending on agents' perception of realignment risk and the intervention rule of the central bank. In the classical Krugman (1991) model in which the target zone is perfectly credible and the central bank only intervenes at the edges of the band (i.e., marginal intervention), H(.) is of the well known (reversed) S-shape with smooth pasting at the boundary. In the extreme case of a managed float regime, when there is no specified band and interventions are mean-reverting towards a central parity, H(.) will become a downward sloping line. In the intermediate case in which there are intra-marginal interventions in addition to marginal ones, H(.) will look more like a linear function with the Krugman S-shape much less pronounced (Lindberg et al., 1993, 1994). When credibility is doubtful, H(.) can become upward sloping throughout the band (Bertola and Caballero, 1992), or of hump-shape with upward sloping sections when credibility is asymmetric in that the central bank's resolve is more credible on the strong side of the band than on the weak side (Bartolini and Bodnar, 1992).

In view of the plethora of theoretically plausible shapes of H(.), we adopt a semi-parametric regression approach in estimating (3.3), with a data-dependent non-parametric specification of H(.). We approximate H(.) by a Legendre orthogonal polynomial of degree L, with L determined by the Schwarz information criterion. By the consistency of the Schwarz criterion and the Weierstrauss approximation theorem for continuous function, this procedure should consistently estimate H(.). More precisely,

$$\begin{aligned} &H(x) \approx \sum_{n=0}^{L} \lambda_n P_n(x), \quad where \\ &(n+1)P_{n+1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x), \\ &P_0(x) = 1,\, P_1(x) = x,\, x \in [-1, 1]. \end{aligned} \tag{3.4}$$

where $\lambda_0, \lambda_1, ..., \lambda_L$ are unknown parameters to be estimated. The use of orthogonal polynomials (as opposed to usual polynomials) significantly reduces the problem of multicollinearity in estimation. We include two state variables in z(t). Following Lindberg et al (1993, 1994), Rose and Svensson (1994) and Svensson (1993), we include the current home-foreign interest differentials as a state variable in predicting within band depreciation. In addition, we follow Mizrach (1995) and Bekaert and Gray (1998) by including the slope of the domestic yield curve (measured by 3-month and 1-month home interest spread) as a predictor.

Another econometric problem with (3.3) is serial correlation in residuals. Being a τ-step ahead forecast error, the residual term in (3.3) is by construction a

MA(τ-1) process. Following the literature (e.g., Rose and Svensson, 1994, among many others), we have tried OLS with the Newey-West covariance matrix. But it turns out that the OLS estimates are rather imprecise, even with a sample of over a thousand observations, suggesting severe efficiency loss due to ignoring the moving average nature of the residuals. We finally estimate the equation by the Hannan frequency domain GLS procedure that fully exploits the MA(τ-1) nature of the residual term.[2] The GLS estimates are much more precise and they are often of similar order of magnitude as their OLS counterparts, indicating that the extra information employed by the GLS procedure is indeed correct and helpful.

We estimate (3.3) and construct realignment expectations for the four countries using daily data up to April 1997, right before the onset of the crisis. The data range for each country can be found in Table 1. All data are from Datastream.

3.2 Determinants of realignment expectations

What determines the market's realignment expectations? If weak economic fundamentals are really the main culprits of the Asian crisis, given the gradual evolving nature of economic fundamentals, it is likely that market participants should have been aware of them and hence incorporated the additional risk into their expectations, which eventually reflected in financial data. In other words, the weak economic fundamentals explanation implies a potentially testable lead-lag relationship between the realignment expectations series and the relevant economic fundamentals variables. Moreover, given the gradual evolving nature of economic fundamentals, the realignment expectations series should show sign of losing credibility during the pre-crisis period. On the other hand, if the Asian crisis is analogous to a bank run

[2] See Harvey (1989) for an exposition of the Hannan frequency domain GLS method.

which catches everybody by surprise according to the liquidity problem explanation, then the financial market should not have anticipated it and hence the realignment expectations series should show no sign of losing credibility during the pre-crisis period.

We investigate the possible lead-lag relationship between realignment expectations and fundamentals by VAR. We focus on the equation in which current realignment expectation is the dependent variable and lagged fundamentals are explanatory variables. The following variables in monthly frequency are included in our list of economic fundamentals: (1) DINFLAT: Domestic-US inflation differentials, (2) MON: Base money-foreign reserve ratio, (3) RX: Real exchange rate, defined as the exchange ratio between domestic goods and US goods, (4) EX: Export-import ratio, (5) JPRATE: Monthly depreciation rate of the yen, (6) GRTH: 12-month growth rate of industrial production, and (7) UMR: Unemployment rate. MON, RX and EX are entered in log in the estimation. The VAR is estimated separately for each of the four countries using the longest possible monthly data series up to April 1997 from the International Financial Statistics. The data appendix gives the acronyms and the definitions of the series.

Constrained by data availability, our list of variables is by no means exhaustive of the very many fundamental weaknesses that have been singled out as contributing factors to the Asian crisis.[3] Except for the depreciation rate of the yen our list of variables are fairly standard in previous literature (e.g., Rose and Svensson,

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[3] These factors can be roughly classified under two categories. The first category is micro-economic or structural weaknesses. A partial list include crony capitalism, weak financial institutions, financial liberalization without proper development in governance, lack of transparency, politically directed lending, implicit government guarantees, policies that favor short-term borrowing at the expense of long-term borrowing, distorted incentive on the part of foreign investors to seek quick return while ignoring downside risk, etc. The second category is macro-economic weaknesses which include standard variables such as slower output growth, overvalued currency, and excessive monetary/credit creation. There are other more region specific factors such as the depreciation of the yen in the 90's and the loss of competitiveness in exports relative to the rest of the world.

1994). Money, output, and inflation differentials are standard ‘fundamentals’ driving exchange rates in traditional monetary models of exchange rate determination. Reserves, trade balance, and the real exchange rate are popular determinants of credibility in various models of balance of payments crisis. One channel through which the depreciation of the yen could affect the dollar pegs of the four Asian countries is real appreciation. Under a dollar peg with Japan being a major trading partner, a significant depreciation of the yen-dollar exchange rate will translate into a significant trade-weighted real exchange rate appreciation.

4 Empirical results

Table 2 reports empirical estimates of the target zone projection equation (3.3) for the four countries. Figures 1a to 1f depict the estimated H(.) function (solid line), with other state variables evaluated at their sample means, overlaid with a scatter plot of interest rate differentials (dots) against the spot rate measured as percentage deviation from central parity. Figures 2a to 2f plot the estimated realignment expectations with approximate 95% confidence bands. Table 3 reports exclusion restrictions tests for the explanatory variables in the VAR equation that explains realignment expectations. Below we interpret these results by country.

4.1 Thailand

The estimated projection equation indicates that H(.) is highly nonlinear: up to a sixth order Legendre polynomial for the 1-month horizon ($\tau = 22$ business days) and a fourth order for the 3-month horizon (65 business days) are required. From the shape of H(.) as depicted in Figures 1a and 1b, we are able to infer the following properties of the Thai pegged exchange rate arrangement. First, it operates as a target zone with asymmetric credibility; the target zone is more credible on the strong side than on the weak side of the band. Second, the Thai central bank seems to rely on marginal intervention in maintaining the target zone. These features are especially pronounced in the 1-month case (Figure 1a). On the strong side of the band (the region from -3 to 0), H(.) is in the Krugman (reverse) S-shape with smooth pasting at the edge and nonlinear mean reverting at the center, both of which are consequences of perfectly credible marginal intervention at the lower bound of the band, according to standard arguments for the Krugman model. The inverted hump-shape of H(.) on the weak side of the band (region from 0 to 3) implies that the central bank is not perfectly credible that it will be able to defend the target zone when the exchange rate reaches the upper edge of the band (Bartolini and Bodnar, 1992).

From Figures 2a and 2b, we see that devaluation pressure (as indicated by a rising realignment expectations) seems to build up gradually towards the end of the sample starting from mid 1995. In columns (a) and (b) of Table 3, we find that only one variable – MON, the money supply to reserve ratio – can significantly explain the realignment expectations for Thailand. One explanation is that this result reflects the destabilizing effect of the rapid domestic credit growth in Thailand during the 90's. Furman and Stiglitz (1998) describe how this happened:

> "Thailand has also witnessed rapid financial liberalization over the past decade. Restrictions on interest rates for many types of borrowing and lending were eliminated in the early 1990s. At the same time, banks were given greater scope in decision making for loans, through the relaxation of mandates in favor of certain types of lending (for example, to agriculture) and the elimination of restrictions against other types of lending (for example, to real estate). In 1991 reserve requirements were reduced, and the scope of permissible capital market activities by banks was expanded to include activities such as financing equity purchases on margin. In addition, by relaxing regulations and increasing incentives, the government promoted a series of financial innovations, including greater use of securities markets and increased access to offshore borrowing and derivatives. Furthermore, the number of nonbank financial institutions expanded dramatically."

In summary, the empirical evidence points to a predictable fundamental weakness -- unsustainable domestic credit growth -- as the culprit for the currency crisis in Thailand.

4.2 Malaysia

From Table 2 and Figures 1c and 1d, we see that the H(.) function is linear, which implies that the Malaysian pegged exchange rate arrangement is either a managed float or a target zone with intra-marginal intervention which differs little from a managed float. We also note that unlike other countries (such as Thailand, Indonesia and Korea), Malaysia's interest rate differential fluctuates narrowly around zero. This observation suggests that there has not been much realignment pressure. Indeed, Figures 2c and 2d confirm that realignment expectations are close to zero. In fact, for the whole sample period, zero is contained in the 95% confidence band, indicating that the null hypothesis of zero realignment expectations (i.e., the peg is perfectly credible) cannot be rejected.

Contrary to the Thailand case, we find that money supply to reserve ratio cannot explain the realignment expectations, but the variable JPRATE (the depreciation rate of the yen) is highly significant. This means that market participants has incorporated into their expectations the potential destabilizing effect of yen's depreciation, although the effect is not expected to be strong enough to derail Malaysian managed float. The finding, that yen's depreciation causes realignment expectations, is qualitatively consistent with the suggestion that the depreciation of the yen might have contributed to the occurrence of the crisis. Nevertheless, for the Malaysian case, the quantitative impact of yen's depreciation seems to be small if not null.

4.3 Indonesia

Although the cubic polynomial in column (e) of Table 2 indicates the presence of nonlinearity, the relative magnitude of the parameter estimates shows that H(.) is in fact very close to linear. The coefficient of the linear term P1 is almost 8 times larger than that of the quadratic term P2, and almost 14 times larger than that of the cubic term P3, in absolute terms. The close-to-linearity pattern in Figure 1e suggests that the exchange rate regime is closer to a "managed float" than a target zone, similar to the case of Malaysia.

The interest rate differentials (Figure 1e) ranging from 4.375% to 18.358% suggest that the Indonesia Rupiah is under rather great devaluation pressure. The plot of realignment expectations in Figure 2e confirms this impression: realignment expectations have been significantly above zero throughout the entire sample period. This finding is perhaps not too surprising as the Indonesian exchange rate arrangement is a crawling peg which devalues at about 5% annually, as discussed earlier. Nevertheless, no sudden jump in realignment pressure was seen right before the 1997 crisis.

In column (e) of Table 3, we find that all variables except MON are significant in explaining the realignment expectations, including the depreciation of the yen as in the Malaysian case. The conclusion is clear: the Indonesian crisis is caused by predictable fundamental weaknesses.

4.4 Korea

Similar to the Indonesian case, column (f) Table 2 indicates the presence of a mildly nonlinear H(.). Figures 1(f) reveals that the nonlinearity is even less pronounced than the Indonesian case. The close-to-linearity pattern suggests that the exchange rate regime is either a managed float or a target zone with intra-marginal intervention, as in the case of Malaysia.

Judging from the interest rate differentials (from about 4% to 13% in Figure 1f), the Korean won seems to be under devaluation pressure throughout the sample period. The plot of realignment expectations (figure 2f) suggests that realignment pressure is absent from mid-1995 to mid-1996, but started to pick up ever since.

In column (f) of Table 3, we find two variables – MON (money supply to reserve ratio), RX (real exchange rate) – are significant in explaining realignment expectations. The variable GRTH (annual growth of industrial production) is also marginally significant. As in the Indonesian case, the empirical evidence points to predictable fundamental weaknesses as the culprit of the 1997 crisis.

5 Conclusion

Did the market anticipate the Asian crisis? Our answer is yes for Thailand, Indonesia and Korea, and no for Malaysia. We find that predictable fundamental weaknesses are pivotal in explaining the crises in Thailand, Indonesia, and Korea. But there is no common set of economic fundamentals that can explain the market's perception of their currencies. In the case of Thailand, it is excessive money/credit growth. In the case Indonesia, there are multiple fundamental weaknesses including an external factor -- the depreciation of the yen. In the case of Korea, the evidence points to excessive money/credit as in the case of Thailand, plus real exchange rate appreciation. For the case of Malaysia, our result provides no support for the fundamental weakness story, suggesting that Malaysia is likely to be a victim of contagion and/or self-fulfilling prophecy.

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Data Appendix

Acronym	Definition	IFS code
JPSP	Japan exchange rate (yen per US$)	158..RF.ZF...
USCPI	US CPI	11164...ZF...
THSP	Thai exchange rate (Thai baht per US$)	578..RF.ZF...
THRES	Thai foreign reserve (US Million)	578.1L.DZF...
THM0	Thai reserve money (billion Thai baht)	57814...ZF...
THCPI	Thai CPI	57864...ZF...
THEXP	Thai export (billion Thai baht)	57870...ZF...
THIMP	Thai import (billion Thai baht)	57871...ZF...
MASP	Malaysian exchange rate (Ringgit per US$)	548..RF.ZF...
MARES	Malaysian foreign reserve (US Million)	548.1L.DZF...
MAM0	Malaysian reserve money (Ringgit millions)	54814...ZF...
MACPI	Malaysian CPI	54864...ZF...
MAEXP	Malaysian export (Ringgit millions)	54870...ZF...
MAIMP	Malaysian import (Ringgit millions)	54871...ZF...
INDSP	Indonesian exchange rate (Rupiah per US$)	536..RF.ZF...
INDRES	Indonesian foreign reserve (US Millions)	536.1L.DZF...
INDM0	Indonesia reserve money (Rupiah billions)	53614...ZF...
INDCPI	Indonesia CPI	53664...ZF...
INDEXP	Indonesia export (US millions)	53670..DZF...
INDIMP	Indonesia import (US millions)	53671..DZF...
KOSP	Korean exchange rate (Won per US$)	542..RF.ZF...
KORES	Korean foreign reserve (US Millions)	542.1L.DZF...
KOM0	Korean reserve money (Won billions)	54214...ZF...
KOCPI	Korean CPI	54264...ZF...
KOIP	Korean industrial production index	54266..CZF...
KOUMR	Korean unemployment rate	54267R..ZF...
KOEXP	Korean export (US millions)	54270..DZF...
KOIMP	Korean import (US millions)	54271..DZF...
KOGRTH	KOIP 12-month growth rate	N.A.
Implied variables (e.g. for Thailand)		
RX	Logged real exchange rate log(THSP*USCPI/THCPI)*100	N.A.
EX	Logged export to import ratio Log(THEXP/THIMP)*100	N.A.
MON	money supply/reserve log(1000*THM0/(THRES*THSP))*100	N.A.
DINFLAT	inflation differential $100*(\log(THCPI_t/THCPI_{t-1})-\log(USCPI_t/USCPI_{t-1}))$	N.A.
JPRATE	Monthly changes of Yen exchange rate $100*\log(JPSP_t/JPSP_{t-1})$	N.A.

Table 1: Summary statistics of percentage deviation of the spot exchange rate from central parity

Country	Sample period	Obs	Mean	Std error	Minimum	Maximum	Range
Thailand	92:9:16 to 97:4:30	1206	0.190	1.177	-2.981	3.586	6.567
Malaysia	94:9:1 to 97:4:30	695	0.581	1.385	-2.573	2.820	5.393
Indonesia	86:10:3 to 97:4:30	2759	-0.001	1.169	-2.787	4.778	7.565
Korea	93:1:4 to 97:4:30	1128	-0.901	1.972	-5.684	2.200	7.884

Notes:

1. For Thailand, the central parity has been assumed to be 25.2 bahts per US dollar. For Malaysia, the central parity is assumed to be 2.5 ringgits per US dollar. For Indonesia, the central parity is assumed to follow a linear trend, estimated via a linear regression (rupiahs per US dollar): 1565.360 + 0.297 * (number of days from 86:10:3). For Korea, the central parity is assumed to be 800 wons per US dollar.
2. Percentage deviation of spot exchange rate from central parity is computed as:
   log(spot exchange rate/ central parity) *100.

Table 2: Estimates of target zone projection equations

	Thailand		Malaysia		Indonesia	Korea
	1-month	3-month	1-month	3-month	3-month	3-month
	(a)	(b)	(c)	(d)	(e)	(f)
Coefficients						
INT	0.155	-0.079	-3.110	-2.989	-0.009	-0.137
	(0.124)	(0.048)	(0.688)	(0.286)	(0.044)	(0.089)
SLOPE	0.326	0.020	-8.571	-8.124		-0.042
	(0.195)	(0.065)	(1.940)	(0.826)		(0.043)
P0	1.959	1.846	7.490	6.682	-2.735	3.442
	(1.040)	(0.755)	(1.786)	(0.812)	(0.595)	(1.505)
P1	-3.856	-4.244	-8.124	-8.787	-8.960	-10.653
	(0.762)	(0.415)	(0.882)	(0.395)	(0.233)	(0.493)
P2	6.388	4.047			-1.030	0.601
	(0.653)	(0.384)			(0.180)	(0.324)
P3	1.223	3.068			-0.632	-0.521
	(0.602)	(0.417)			(0.169)	(0.258)
P4	-3.305	1.036				
	(0.629)	(0.324)				
P5	-4.468					
	(0.646)					
P6	-1.726					
	(0.513)					
Sample size	1184	1141	673	630	2694	1063
R^2	0.18	0.30	0.17	0.54	0.37	0.32

Notes:

1. INT stands for interest rate differential with the United States; SLOPE stands for the term structure; P0 to P6 are the terms of Legendre polynomial.
2. The selection of the Legendere polynomial order is based on the Schwarz information criterion.
3. Hannan frequency domain GLS Estimates with standard errors in parentheses.

Table 3: Determinants of realignment expectations

	Thailand		Malaysia		Indonesia	Korea
Lagged explanatory variables	1-month (2 lags) (a)	3-month (2 lags) (b)	1-month (2 lags) (c)	3-month (2 lags) (d)	3-month (5 lags) (e)	3-month (2 lags) (f)
1. AFWD	0.000	0.000	0.009	0.007	0.000	0.000
2. DINFLAT	0.654	0.693	0.787	0.642	0.018	0.513
3. MON	0.104	0.006	0.821	0.608	0.353	0.005
4. RX	0.530	0.731	0.800	0.722	0.029	0.008
5. EX	0.476	0.161	0.225	0.117	0.006	0.397
6. JPRATE	0.352	0.892	0.045	0.019	0.008	0.648
7. GRTH						0.117
8. UMR						0.640
DW	2.09	2.01	2.16	2.17	2.03	2.08
BG(4)	0.459	0.952	0.853	0.772	0.394	0.951
Sample size	52	52	28	28	121	48

Notes:

1. Rows 1 to 8 report the significance of the null hypothesis of no cumulative effect of a variable on the realignment expectations..
2. AFWD denotes the realignment expectations; DINFLAT denotes the inflation rate differentials with the United States; MON denotes the money supply to reserve ratio; RX denotes the real exchange rate relative to the United States; EX denotes the export to import ratio; JPRATE denotes the monthly depreciation rate of Yen; GRTH denotes the 12-month growth rate of industrial production; and UMR denotes the unemployment rate.
3. DW = Durbin-Watson statistic
4. BG(4) = Breusch-Godfrey test of 4 th order serial correlation in the residuals. The reported numbers are significance levels of the test. A Large number indicates no serial correlation.

Figure 1a: Expected rates of depreciation and interest rate differentials against deviation of spot rate from central parity (**one month, Thailand**)

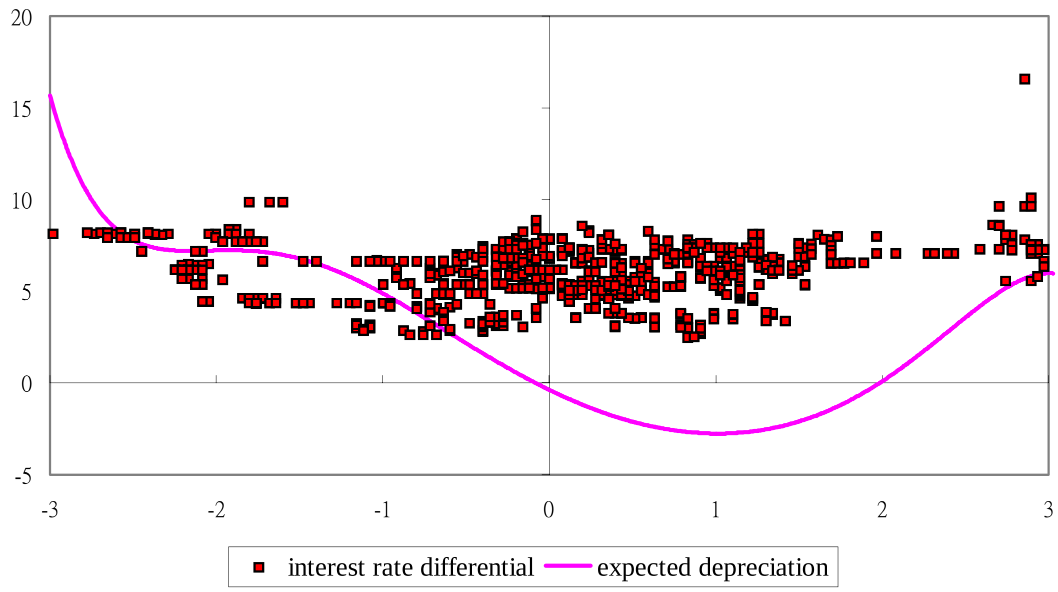

Figure 1c: Expected rates of depreciation and interest rate differentials against deviation of spot rate from central parity (**linear one month, Malaysia**)

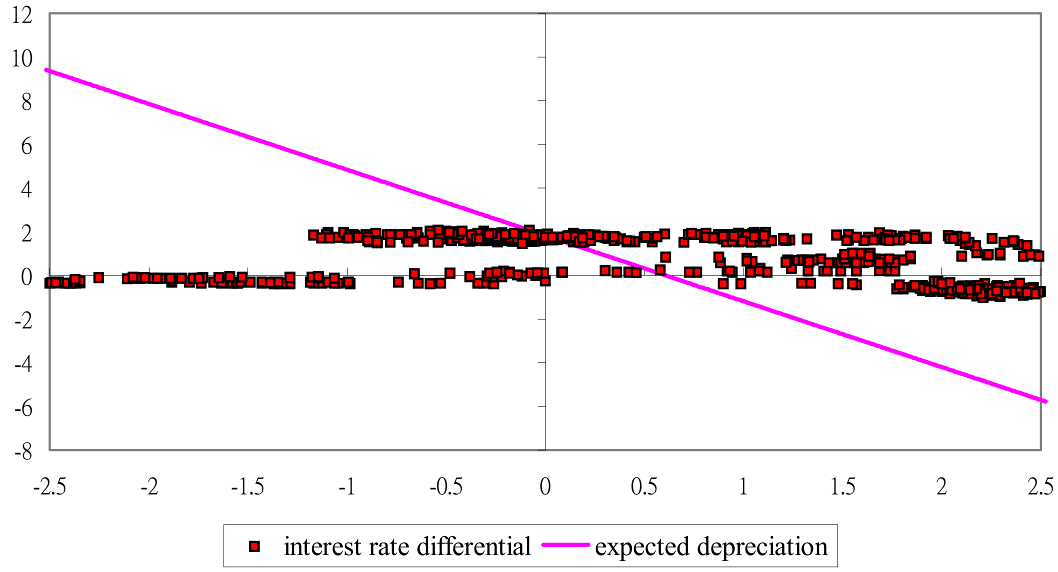

Figure 1d: Expected rates of depreciation and interest rate differentials against deviation of spot rate from central parity (**linear three months, Malaysia**)

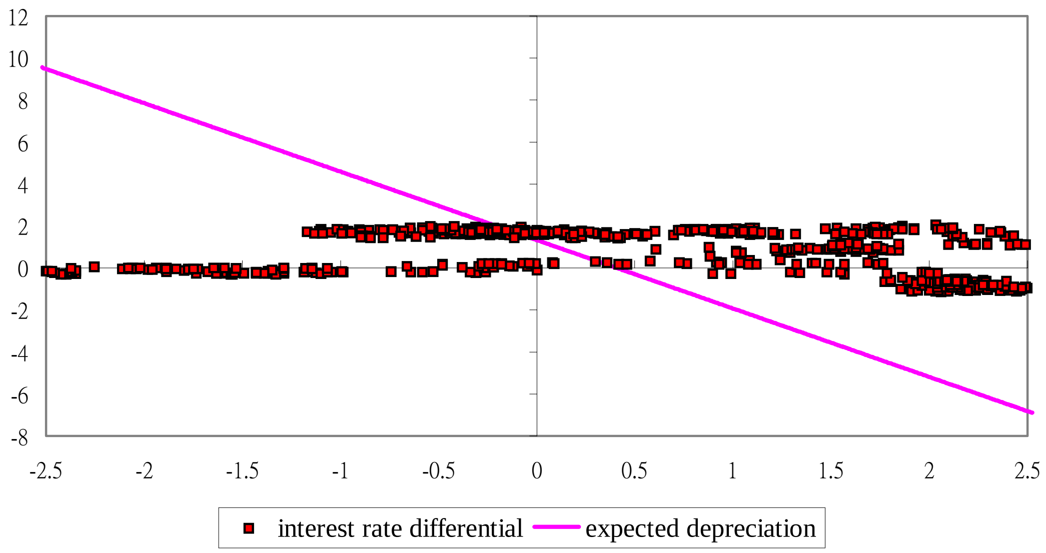

Figure 1e: Expected rates of depreciation and interest rate differentials against deviation of spot rate from central parity (**three months, Indonesia**)

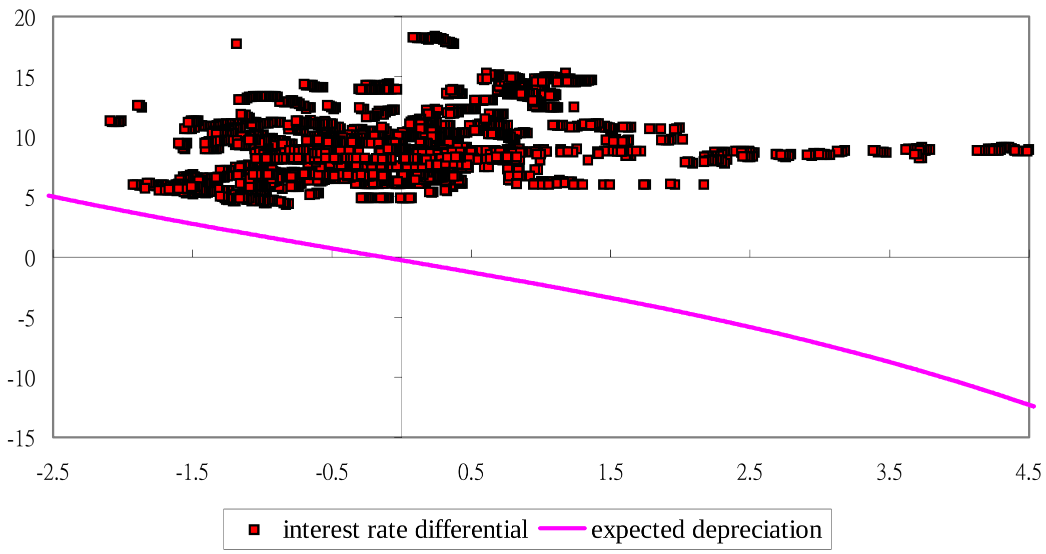

Figure 1f: Expected rates of depreciation and interest rate differentials against deviation of spot rate from central parity (**three months, Korea**)

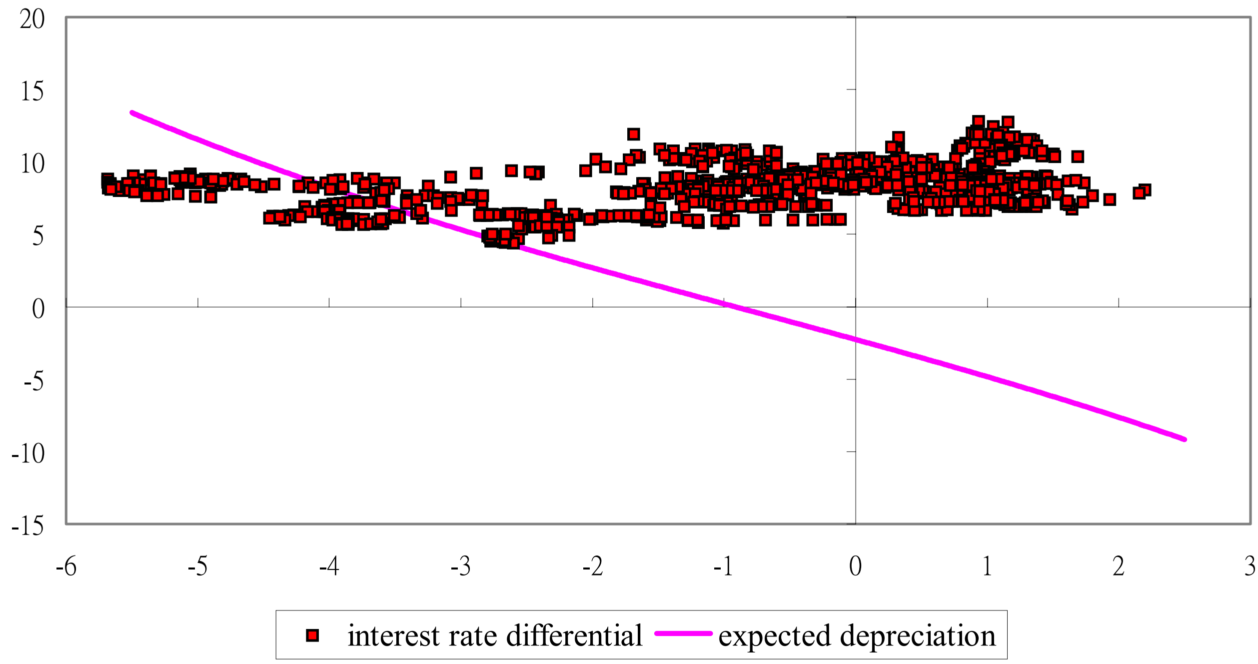

Figure 2a: Realignment Expectations (**one month, Thailand**)

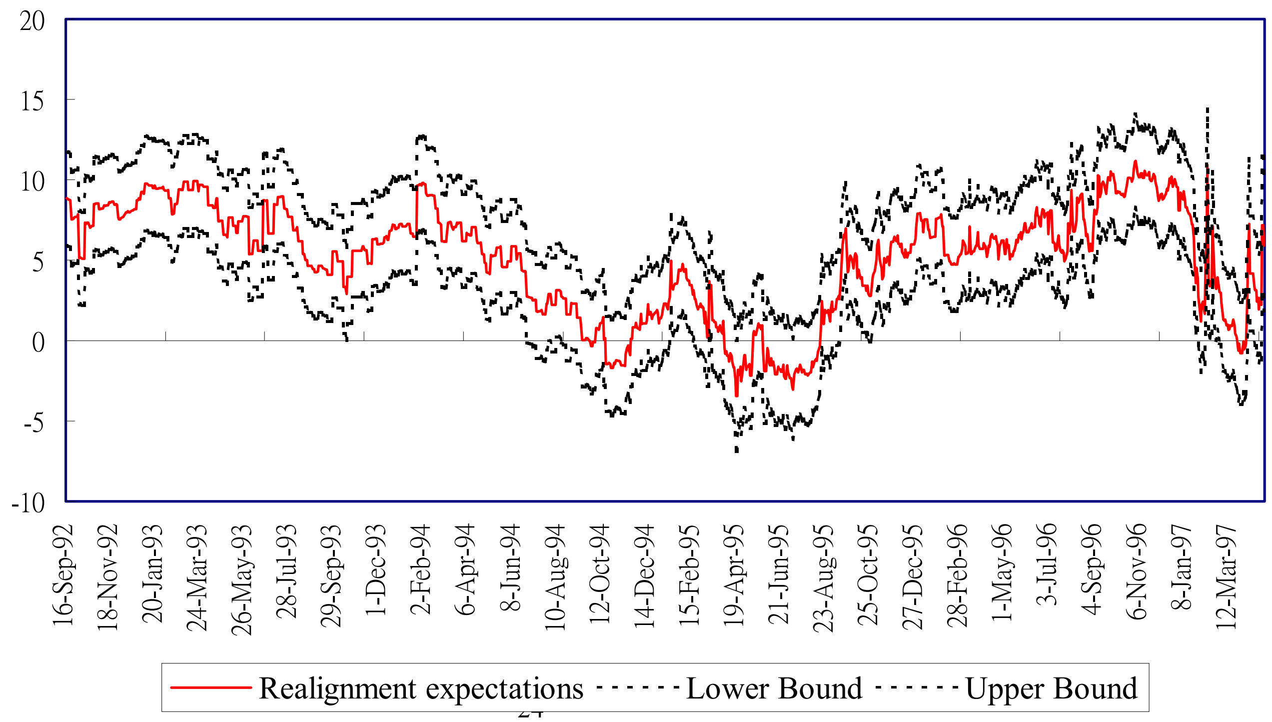

Figure 2b: Realignment Expectations (**three months, Thailand**)

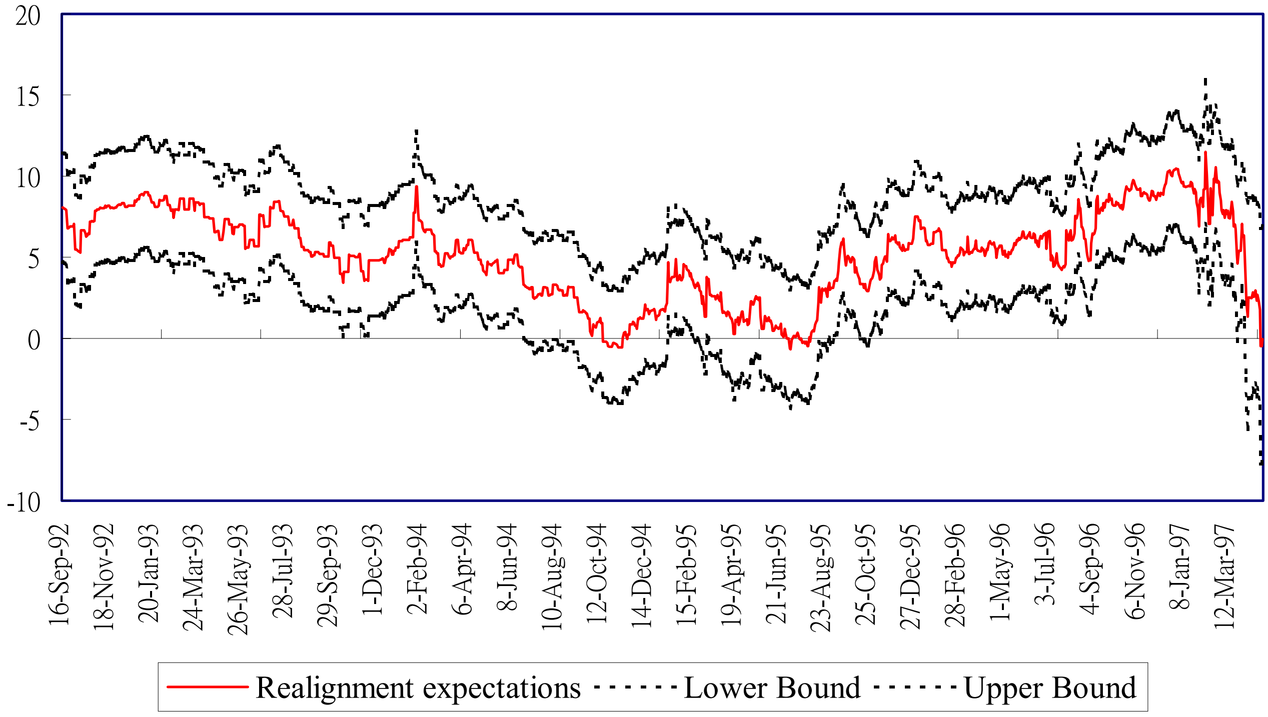

Figure 2c: Realignment Expectations (**linear one month, Malaysia**)

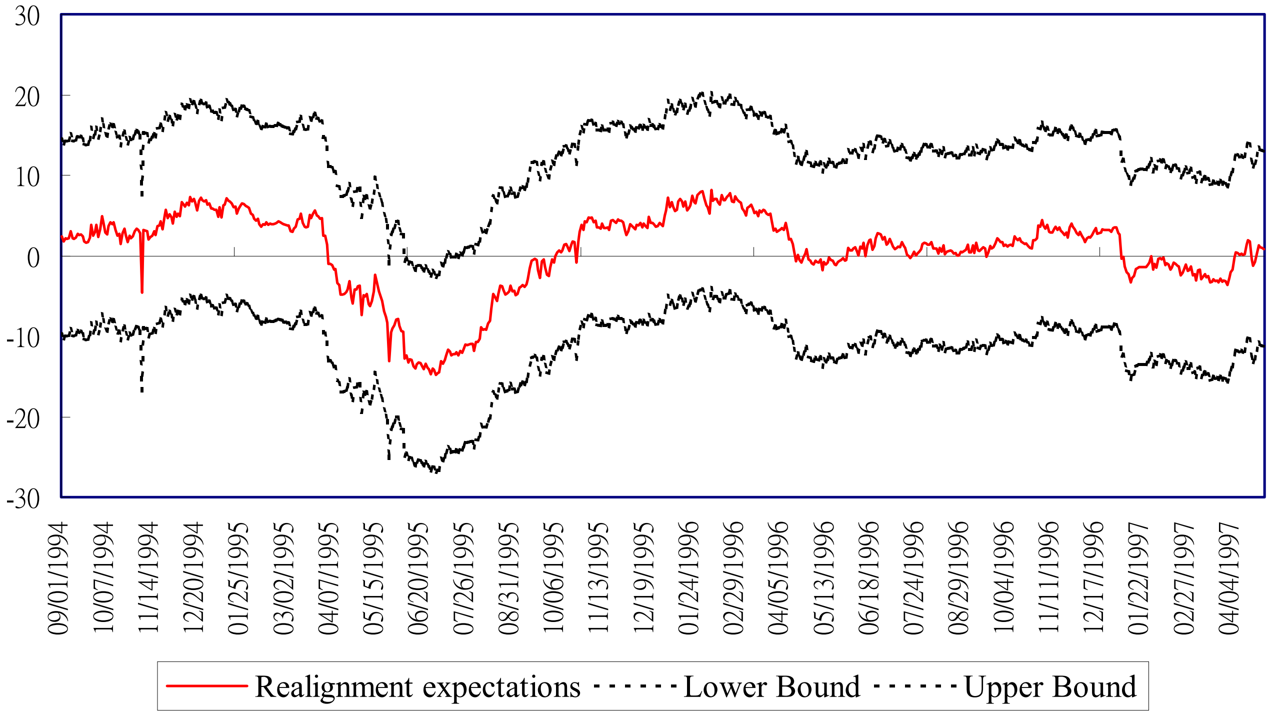

Figure 2d: Realignment Expectations (**linear three months, Malaysia**)

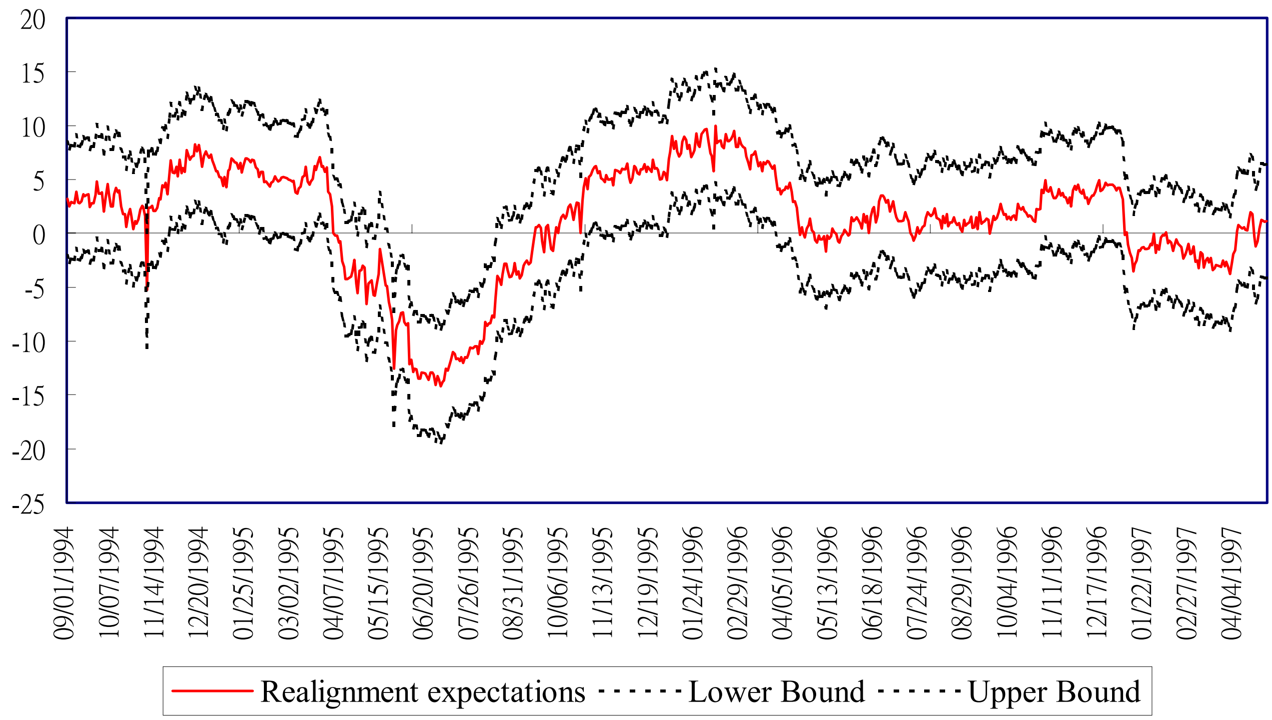

Figure 2f: Realignment Expectations (**three months, Korea**)

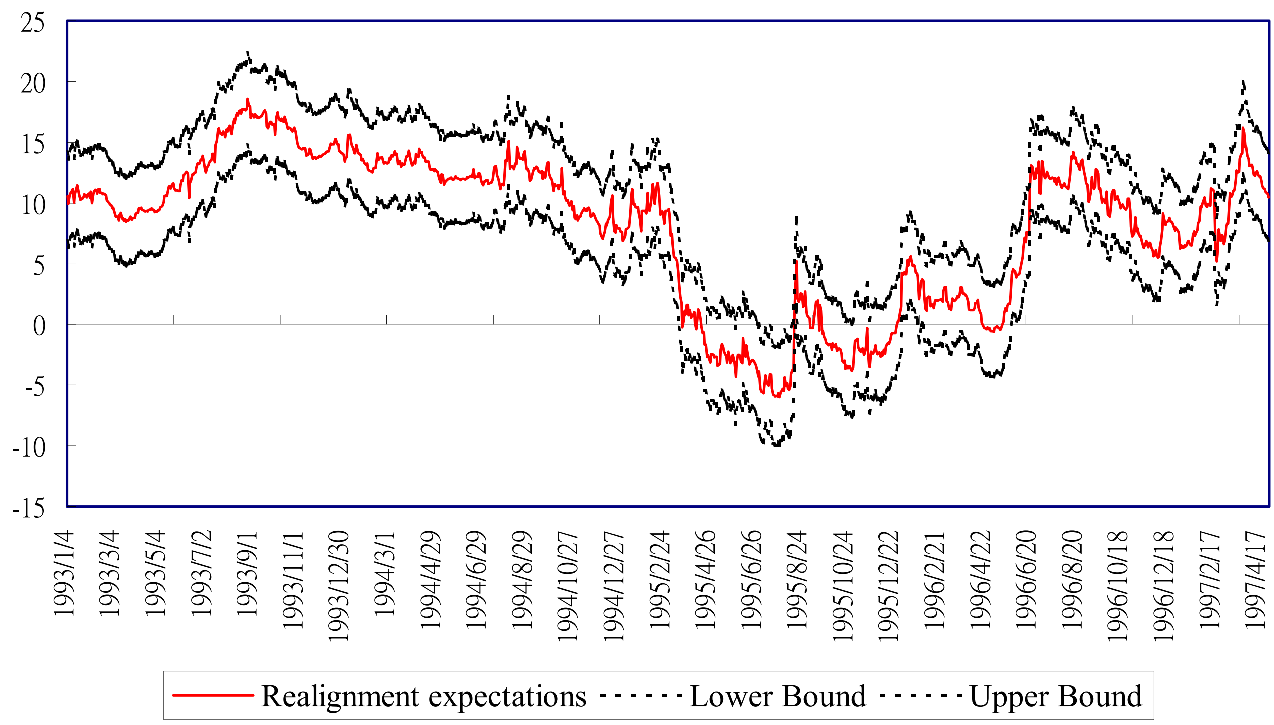

Figure 2e: Realignment Expectations (**three months, Indonesia**)

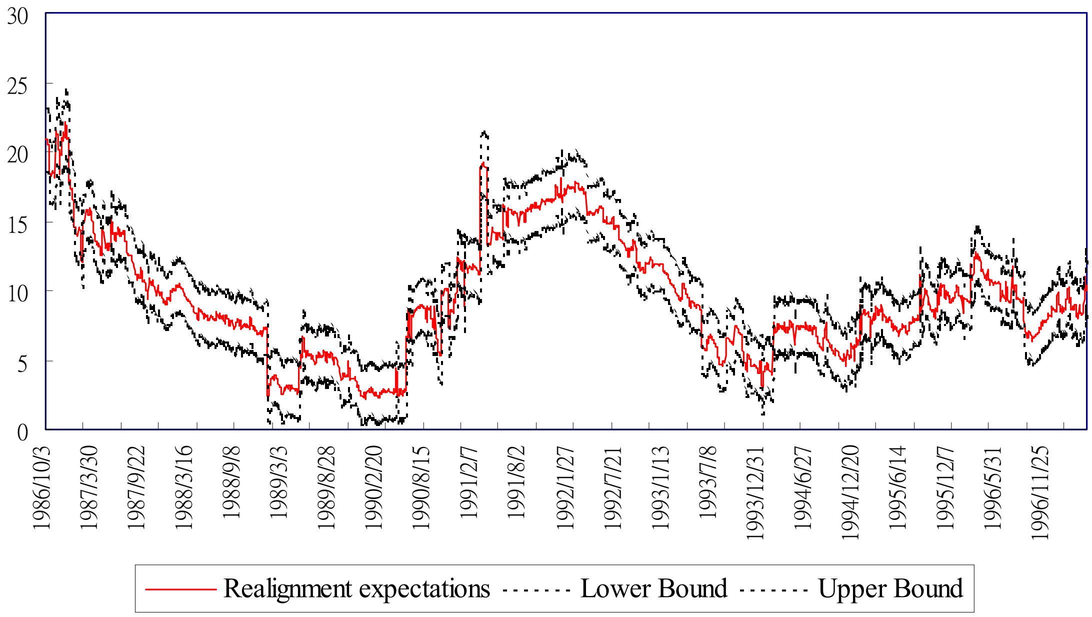

Figure 2f: Realignment Expectations (**three months, Korea**)