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CIES DISCUSSION PAPER 0406

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Abstract:

Early constructions of a single crisis index known as the exchange market pressure (EMP) index have largely been based on the fluctuations of the real or nominal exchange rate of a currency against the US dollar ---the most commonly accepted anchor currency in the global market. Hardly any studies have however tested the sensitivity of this crisis index to the choice of “the anchor” currency. To address this pertinent issue, our study considers the case of Thailand for the period of 1985 to 2003. The test results indicate that the EMP index of the baht / the US dollar rate reported substantially less number of speculative attacks against the baht than that reported by the EMP index of the baht / the Japanese yen rate.

JEL Classification: F31, F41

Key Words: Currency Crisis; Exchange Market Pressure; Extreme Value Theory; Thailand.

I. Introduction

One of the primary focuses of recent researches on currency crisis has been on the construction of a single crisis index that expectedly will systematically behave differently prior to a crisis and hence provide a reliable warning of the potential crisis. Studies such as Eichengreen, Rose and Wyplosz (1994, 1995, 1996), Sachs, Tornell and Velasco (1996) and Kaminsky, Lizondo and Reinhart (1998, 1999) have proposed different constructions of this early warning signal, known as an index of "*exchange market pressure (EMP)*".

The EMP index is usually a weighted average of the rate of fluctuation of the local currency (against a major world currency in either nominal or real level), the monthly percentage changes in international reserves, and the monthly change in the interest rate. It is important to underscore here that an exchange market pressure (EMP) is not only defined as capturing instances of successful attacks, i.e., when a significantly large depreciation of the currency occurs, but as well as instances of unsuccessful attacks (pressure rebuffed by loss in reserves and/or rise in interest rates) (Kaminsky, Lizondo, and Reinhart, 1998; Goldstein, Kaminsky, and Reinhart, 2000).

To our knowledge, the constructions of the EMP indices until now have largely been based on the fluctuation of the real or nominal exchange rate of a currency against that of the US dollar ---the most commonly accepted anchor currency in the global market. However, hardly any studies have tested the sensitivity of this crisis index to the various possible choices of "the anchor" currencies.

Addressing this concern of selecting appropriate anchor currencies is arguably imperative for enhancing the effectiveness of the EMP crisis index, especially for economies like most of the 1997 financial crisis effected Southeast Asian countries. Studies have shown that the US dollar played a major role in explaining the fluctuations of the nominal exchange rates of the currencies in this part of the world.[1] At the same time however, various key economic statistics of these countries conclusively indicate the significant roles of the Japanese economy and the yen in this region (Ito (1994), Ito et.al (1998), Rajan and Siregar (2002) and Rajan et.al. (2004)). Few questions emerge naturally when constructing an EMP index for any of these economies. Does it matter which of these major global currencies (i.e. the U.S. dollar or the Japanese yen) act as the anchor currency? Would the EMP index of the local currency against the US dollar be able to comprehensively capture the presence of speculative attacks against the local currency? Given the role of the Japanese market, should the EMP of the local currency against the Japanese yen be constructed as well?

To address these pertinent questions, this study will consider the case of Thailand for the period of 1985 to 2003. Starting in late 1984 to the middle of 1997, the baht was officially pegged to a basket of major trading partners' currencies (Bank of Thailand, 1998; Rahmatsyah, Rajaguru, and Siregar, 2002). However, on a de-facto basis, Thailand and the other regional economies in Southeast Asia accorded the U.S. dollar with the overwhelming influence in their nominal exchange rate policy.[2] Whereas, the Japanese yen taking an almost negligible role.

This was notwithstanding the fact that compared to the U.S., Japan was also a major export market and Thailand's biggest source of imports, such that, while Thailand's bilateral trade balance against the U.S. has largely been in a surplus, it has consistently been in a trade deficit against Japan for the entire period of observation (Figure 1 (panels a-c)).

With the exception of the years 1985, 1992, 1994 and 1999, Japan has remained as the dominant source of direct investment flows into Thailand compared to the U.S. during the last two decades (Figure 2). Furthermore, a substantial share

[1] Kwan (1995); Benassy-Quere (1996); Takagi (1996); Kawai and Akiyama (1998); Ohno (1999); Kawai and Akiyama (2000); Beng (2000); McKinnon (2001); Baig (2001); Kawai (2002); McKinnon and Schnabl (2002).

of bank lending to Thailand has been attributed to Japanese banks and the yen is already the major currency of denomination for long-term debt to Thailand (Figures 3 and 4). In other words, given the important economic and financial significance of Japan and the yen to Thailand, the pre-1997 financial crisis exchange rate policy adopted by Thailand suggests *a-priori* the under-representation of the yen in the exchange basket-regime of Thailand (Ito, et.al (1998) and Rajan et.al (2004). [3]

This study adopts a version of the concept of exchange market pressure (EMP) index as employed by Kaminsky, Lizondo, and Reinhart (1998 and 1999)---henceforth KLR index. Due to the non-normality of the statistical distribution of the EMP indices in general, we have to avoid relying too much on parametric assumptions in identifying speculative attacks. Studies as early as the 60s have clearly established that short-term foreign currency fluctuations/returns and interest rates are non-normal and displaying fat and heavy-tails. [4] Accordingly, our study will apply the Extreme Value Theory (EVT) and adopt a modified estimator proposed by Huisman, Koedijk, Kool, and Palm (2001) ---henceforth HKKP. The application of HKKP enables us to generate more consistent analyses even with a relatively small sample cases.

The outline of the paper is as follows. Brief stylised facts on the bilateral real and nominal exchange rates of the baht against the US dollar and the yen are presented next. Section 3 will then briefly review the basic constructions of the exchange market pressure index suggested by Kaminsky, Lizondo and Reinhart (1998). The Extreme Value Theory and the HKKP methodology will be discussed in

[2] See footnote #1.

[3] Ito et.al (1998) estimate that the optimal weight for the yen in the basket of currencies for the bath should at least be around 39 percent between 1986-1996, but the actual weight was only around 5 percent.

4 (Mandelbrot (1963), (1964), (1967), Roll (1970); Rogalski and Vinso (1978); McFarland, Petit, and Sung (1982); Boothe and Glassman (1987) and Koedijk, Schafgans and de Vries (1990); Brenner, Harjes, and Kronner (1996); Andersen and Lund (1997); Koedijk, Nissen, Schotman, and Wolff (1997)).

section 4. The empiric section covering the data and the testing will then follow (section 5). Section 6 presents and discusses different events that may have arguably been responsible for the currency attacks. This paper ends with brief concluding remarks (section 7).

2. Trends in Nominal and Real Exchange Rates

The stability of the bilateral nominal exchange rate of the baht vis-à-vis the U.S. dollar pre-crisis is clearly evident from Figure 5 (panel a), whereas, other than the noted stability of the bilateral nominal exchange rate of the baht vis-à-vis the Japanese yen during the initial months of the sample observation, marked volatility had characterized the movement of this bilateral nominal rate of the baht with the Japanese yen, which especially during the pre-crisis is what we would expect given the de-facto U.S. dollar peg mentioned earlier. The observed pre-crisis stability of the baht against the U.S. dollar dramatically changed starting in the middle of 1997 and onwards, which coincided with the apparent breakdown in the de-facto soft-U.S. dollar peg.

Meanwhile, as depicted in Figure 5 (panel b), the same degree of observations can be put forward when examining the movements of the real exchange rate of the baht against the U.S. dollar and Japanese yen. As noted, the same degree of pre-crisis stability is found in the case of the real exchange rate of the baht against the U.S. dollar. Likewise, after the observed stability in the initial months of the sample observation, a sharp depreciation of the baht against the Japanese yen occurred sometime in late 1985 (which also coincided with the conclusion of the Plaza Accord in 1985).

In between late 1985 to 1988, after accounting for some brief spells of real appreciation against the Japanese yen, the real exchange rate of the baht against the Japanese yen tended to gradually depreciate (which coincided with the yen appreciating against the U.S. dollar for most of the late 80s). This situation was briefly reversed in 1989 and 1990 when the baht appreciated against the yen before depreciating again for quite sometime from 1990 to late 1995 (when the yen appreciated sharply against the U.S. dollar). It is also interesting to mention here that the sharp depreciation of the baht against the U.S. dollar and the Japanese yen from mid-1997 to 1998 was preceded by an almost equally sharp nominal and real appreciation of the baht against the U.S. dollar and Japanese yen from late 1995 to mid-1997. While the sharp spikes both in nominal and real terms experienced by the Thai baht with respect to the U.S. dollar and Japanese yen during the middle of 1997 and 1998 had somewhat tapered-off in recent years, nonetheless, the rates can still be greatly considered as being visibly volatile. Similar general findings are also reported by Rajan et.al (2004). [5]

3. The Exchange Market Pressure Index

Considering large movements in nominal exchange rates accounts for the most dramatic forms of currency crises, e.g., episodes of forced devaluation which emanate from a sharp break from a historical regime of fixity and accelerations of depreciations from a regime of more flexible rates, volatility alone in the nominal exchange rate understate the magnitude of crises as this excludes episodes of unsuccessful attacks. Government policies manifested through monetary policy actions and intervention in the foreign exchange market, moderate supposed large movements in exchange rates. In the same manner, considering in isolation, movements in reserves and interest rate aside from exchange rates also offer only a partial view of the severity of shocks in the economy. Nonetheless, combining them

[5] This study calculates the moving sample standard deviation of the growth rate of the real exchange rate of the baht against the US dollar and the baht against the yen for the period of 1981 - 1996

should convey a more informative and reasonable measure of the extent of currency crises, and referred to as the index of exchange market pressure.

The seminal idea comes from the early work of Girton-Roper (1977) that any excess demand for foreign exchange can be fulfilled through non-mutually exclusive conduits. If the speculative attack (currency pressure) is successful, there is a sharp depreciation of the domestic currency. However, at other times, the attack can be repelled or warded off through raising interest rates and/or running down on the foreign exchange reserves.

In so doing, a measure of the extent of currency pressure can be constructed as a weighted average of the changes in exchange rate, in foreign exchange reserves, and in interest rates. The exchange rate is said to be under 'stress' (there is selling pressure) if there is a significant increase in the exchange market pressure index.

The question is how to weigh the three components of the index of speculative pressure. An unweighted index is simpler to construct, but the major drawback is that an unweighted index will be driven or dominated by the most volatile variable, and usually it is the movements in reserves. Next, we will briefly review a recently commonly adopted construction of the EMP index that will then be employed for our empirics.

3.1 Kaminsky, Lizondo and Reinhart (1998 and 1999)

The original construction of the EMP index of Kaminsky, Lizondo, and Reinhart (KLR) (1998 and 1999) can be expressed as a following:

$$EMPI_{i,t} = \frac{\Delta e_{i,t}}{e_{i,t}} - \frac{\sigma_e}{\sigma_r}\frac{\Delta r_{i,t}}{r_{i,t}} \qquad (1)$$

where: $EMPI_{i,t}$ is the exchange rate market pressure index for country *i* in period *t*; $e_{i,t}$ the units of country *i*'s currency per U.S. dollars (or other anchor currencies, such as the Japanese yen) in period *t*; and σ_e the standard deviation of the rate of change in the exchange rate ($\frac{\Delta e_{i,t}}{e_{i,t}}$); $r_{i,t}$ gross foreign reserves of country *i* in period *t*; σ_r is the standard deviation of the rate of change in reserves $\left(\frac{\Delta r_{i,t}}{r_{i,t}}\right)$.

However, they also noted the important role of interest rate in capturing the market pressures on exchange rate at any particular period of time.[6] Hence for our study, we will apply the following modified KLR index:

$$EMPI_{i,t} = \frac{\Delta e_{i,t}}{e_{i,t}} - \frac{\sigma_e}{\sigma_r}\frac{\Delta r_{i,t}}{r_{i,t}} + \frac{\sigma_e}{\sigma_{\text{int}}}\Delta \text{int}_{i,t} \qquad \text{(1b)}$$

where, in addition to the basic variables listed in equation (1), we have $\text{int}_{i,t}$ the nominal interest rate for country *i* in period *t*; and σ_{int} the standard deviation of the change in the nominal interest rate, $\Delta \text{int}_{i,t}$.

From equation (1b), one can observe the different weights given to these three key components of exchange market pressures. In particular, the weights for the interest rate and reserve fluctuations depend on the relative size of their standard deviations (σ_{int} and σ_r, respectively) against that of the exchange rate (σ_e). The EMP index increases with a depreciation of the domestic currency, a loss of international reserve and a rise in the domestic interest rate. A rise in index reflects stronger selling pressure on the domestic currency.

4. The Extreme Value Theory and The HKKP (2001)

4.1 Extreme Value Theory[7]

[6] KLR (1999) argue that they did not include the interest rate component in their application because of the lack of complete interest rate data for the countries that they studied (pg.498).
[7] This section draws heavily from de Vries (1994), Koedijk and Kool (1992), Koedijk, Stork, and de Vries (1992); Huisman, Koedijk, Kool and Palm (2001).

Consider a stationary sequence $X_1, X_2, \ldots, X_n$ of i.i.d. random variables with a common distribution function. Suppose one is interested in the probability that the maximum

$$M_n = \max(X_1, X_2, \ldots, X_n) \qquad (2)$$

of the first n random variables is below a certain level x. As is well known, this probability is given by

$$P(M_n \leq x) = F^n(x) \qquad (3)$$

Extreme value theory studies the limiting distribution of the order statistic M_n appropriately scaled. That is, one is interested under which conditions there exist suitable two normalising constants $a_n > 0$ and b_n, such that:

$$P(M_n - b_n \leq a_n x) \xrightarrow{d} G(x) \qquad (4)$$

where $G(x)$ is a so-called a extreme value distribution and the superscript d indicates convergence in distribution. If $1 - F(x)$ is regularly varying at infinity, choosing $b_n = 0$ and $a_n = F^{-1}(1 - 1/n)$ we have

$$G(x) = \exp(-x^{-\alpha}) \qquad \alpha > 0 \qquad (5)$$

where α is the tail index. The tail index is a good indicator of the tail fatness as it is related to the number of moments that exist.

The advantage of the extreme value approach is that all fat-tailed models are nested with respect to their tail index into one model. The tail index, given a number of observations X_i can be estimated by parametric and nonparametric methods. The latter method is presented. Assume that $X_1, \ldots, X_n$ is a sample of independent realisations from a distribution $F(x)$ with a regularly varying tail. Thus,

$$\lim_{t \to \infty} \frac{1 - F(tx)}{1 - F(t)} = x^{-\alpha} \qquad \alpha > 0 \qquad (6)$$

Suppose the density $f(x)$ exists. Through integration by parts we have the following equivalence:

$$\int_1^\infty \frac{1-F(tu)}{u}du = \log u[1-F(tu)]\Big|_1^\infty + \int_1^\infty \log u\, f(tu)t\, du$$

$$= \int_1^\infty [\log(tu) - \log t] f(tu)t \; du$$

$$= \int_t^\infty (\log x - \log t) f(x) \; dx \qquad (7)$$

Combining equation (5) and (6) and applying the Lebesque convergence theorem (interchanging the limit of the integral with the integral of the limit):

$$\frac{\int_t^\infty (\log x - \log t) f(x)dx}{1-F(t)} = \int_1^\infty \frac{1-F(tu)}{1-F(t)}\frac{du}{u} \to \int_1^\infty u^{-\alpha}\frac{du}{u} = \frac{1}{\alpha} \qquad (8)$$

Let $X_{(n)} \geq X_{(n\text{-}1)} \geq \ldots \geq X_{(1)}$ denote the ascending order statistics from the sample $X_1, \ldots, X_n$. Replace the left-hand side expression of equation (7) by its simple analog in order to estimate the inverse tail index $\gamma = 1/\alpha$. Let $F_n(.)$ denote the empirical distribution function. Thus, for some k, which is the number of tail observations used to estimate α and n represents the total number of return observations, take $t = X_{(n\text{-}k)}$ and hence:

$$\hat{\gamma} = \frac{1}{k}\sum_{i=0}^{k-1} \frac{\log X_{(n-i)}}{X_{(n-m)}} \qquad (9)$$

is the estimator first proposed by Hill (1975). Mason (1982) proved that under some regularity conditions $\hat{\gamma}$ is a consistent estimator for γ. Goldie and Smith (1987) showed that $(\hat{\gamma} - \gamma)k^{1/2}$ is asymptotically normal with mean 0 and variance γ^2. Consequently, $\hat{\alpha}$ is also asymptotically normal with mean α and variance α^2/k.

4.2 The Hill and the HKKP Estimator

However, given the relatively small observation size that we have for this study, the Hill estimator will suffer from small sample bias. To deal with this, we apply the tail index estimator proposed by Huisman, Koedijk, Kool, and Palm (2001) ---henceforth HKKP---, which is unbiased in small sample cases. The HKKP methodology starts with the Hill (1975) estimator presented earlier (Eq.9) with a slightly different expression:

$$\gamma(k) = \frac{1}{k}\sum_{j=1}^{k} \ln(x(n-j+1) - \ln(x(n-k)) \qquad (10)$$

where, as discussed early, we assume that there is a sample of n positive independent observations drawn from some unknown fat-tailed distribution. Let the parameter γ be the tail-index of the distribution, and $x(i)$ be the ith-order statistic such that $x(i-1) \leq x(i)$ for $i = 2,......,n.$ k is the pre-specified number of tail observations. By ordering the observations by their sizes and not by the original dates, the sample observations are arguably becoming independently distributed. Naturally, the choice of k is crucial to obtain an unbiased estimate of the tail-index.

HKKP (2001) shows that for a general class of distribution functions the asymptotic expected value of the conventional hill estimator to be biased and increasing monotonically with k. Similarly, the asymptotic variance of the Hill estimator to be proportional to $\left(\frac{1}{k}\right)$. Generally, this problem will only be resolved when the sample size goes to infinity for given k.

For our small sample observations, HKKP (2001) introduces an estimator that overcomes the problem of the need to select a “single” optimal k in small sample observations. HKKP (2001) proposes that for values of k smaller than some threshold value κ, the bias of the conventional Hill estimate of γ increases almost linearly in k and can be approximated by:

$$\gamma(k) = \beta_0 + \beta_1 k + \varepsilon(k), \qquad k = 1,2,...., \kappa \qquad (11)$$

where: β_0 and β_1 are the intercept and the estimate coefficient. $\varepsilon(k)$ is a disturbance term. HKKP (2001) also shows that the modified Hill estimator is quite robust with the choice of κ to be around $\left(\frac{n}{2}\right)$. Accordingly, for our empirics, we propose to compute $\gamma(k)$ for a range value of k from 1 to κ (roughly equal to $\left(\frac{n}{2}\right)$).

To estimate Equation (11), HKKP (2001) adopt the Weighed Least Squares (WLS), instead of the Ordinary Least Squares (OLS), to deal with the potential heteroscedasticity in the error term $(\varepsilon(k))$ of Equation (11). The weight has $\left(\sqrt{1}, \sqrt{2}, ...\sqrt{k}\right)$ as diagonal elements and zeros elsewhere. The estimate of γ from the WLS regression is an approximately unbiased estimate of the tail-index.

5. Data and Empirical Testing

5.1 Data

All data in monthly frequencies were drawn from the IMF International Financial Statistics database covering the period from 1985 to 2003. The exchange rate is expressed in Thai baht per U.S. dollar and Japanese yen. To avoid the issue of treating separately high-inflation episodes with regard to the construction of the exchange market pressure (EMP) indices, a measure of the real exchange rate is calculated by multiplying the nominal exchange rate by the relative price given as:[8]

$$RER_t^{U.S/JP.} = \left(NER_t^{U.S/JP.}\right) * \left(\frac{P_t^{US/JP}}{P_t}\right) \quad (12)$$

where P is the consumer price index of Thailand, and $P^{USA/JP}$ is the U.S. and Japanese consumer price index, respectively. An increase in RER_t (real exchange rate) or NER_t (nominal exchange rate) implies an appreciation of the U.S. dollar and Japanese yen against the baht.

The remaining data requirements in the construction of the exchange market pressure indices are as follows. The Thai overnight money market rate is adopted for the domestic rate. Line 11 of the IMF-IFS database (foreign assets of the monetary authorities) is used as the measure of foreign exchange reserves.

5.2 Empirical Testing

5.2.1 EMP Index

Table 1 presents descriptive statistics of the mean and standard deviations of the EMP indices during four different periods. From the relative size of the mean to the standard deviation (MSD), the EMP of the bath against the yen during the pre-1997 financial crisis was undoubtedly more volatile than the index for the bath against the US dollar, particularly for 1985-1989 period. The size of the standard of deviations for the EMP of the bath against the yen was in average higher than that of the bath against the US dollar. Based on the descriptive statistics posted in Table 1, we can at least concur that the two constructions of the EMP index provide us with respectably two contrasting results.

Few more observations can be generated as well. First, both of the EMP indices are skewed to the right. Second, the EMP indices exhibit excess kurtosis which reflects fat-tailedness.[9] Third, the Jarque-Bera statistics are highly significant for both indices which further confirms the non-normality of the EMP indices.[10] These outcomes are further substantiated by visual evidence in Figure 6 with the histogram of the EMP series constructed using both exchange rates of the baht with the U.S. dollar and Japanese yen, overlaid by its corresponding normal probability density functions. In all cases, it is obvious that both EMP indices depart significantly

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[8] Similar results were obtained when the nominal exchange rate is used.
[9] Excess with respect to the normal distribution which has a kurtosis equal to 3.
[10] Kolmogorov-Smirnov and Shapiro-Wilk statistics further support this result. The results can be made available upon request.

from the normal distribution—mass of observations in the tails and the observed regularity of a great number of peak observations at the centre of the distribution.

5.2.2 The Unit-Root Test and the Ljung Box Q-statistics Test

A preliminary step in proceeding with extreme value analysis is to examine the unit-root property of the EMP index. Table 2 presents the combined results from the commonly used ADF unit root test as well as from the alternative KPSS unit root test. In all, both EMP indices are $I(0)$ variables at the 1 per cent significance level according to the ADF test. In general, confirmatory results from the KPSS unit-root test show that the EMP indices are stationary at the 10 percent significance level or even stronger**.** We also report the Ljung-Box Q-statistic tests with the null hypothesis of no autocorrelation. The results confirm that the null hypothesis cannot be rejected (Table 2B).

5.2.3 The Hill and HKKP Estimators

In order to capture the tail mass or outliers it is mandatory to estimate the so-called tail index (γ), and as earlier mentioned, we use the Hill estimator for this purpose.[11] The Hill estimator requires that the EMP series are rank-ordered from lowest to highest denoted as (x_i), and uses maximum likelihood estimation of the tail index (γ). In accordance with the suggestion of HKPP (2001), to deal with the estimation of the tail with a small sample size, we use equation (11) in estimating a weighted least squares (WLS) regression, after computing the $\gamma(k)$ for a range of values of k.[12] Consequently, the essence is to identify the right-tail outliers or 'extreme value' observations since the right-tail distribution of any EMP index

[11] γ also equals $1/\alpha$, where α refers to the maximum number of existing finite moments. As is customary in the literature, the tail index is either referred to as γ or α, it is used here interchangeably.

[12] The WLS results are not reported here, but they can be made available upon request.

ordered distribution will automatically determine the number and incidence of currency pressure episodes that Thailand experienced during the sample observation. Accordingly, Diebold, Schuermann, and Stroughair (DSS) (2000) suggested, similarly employed by Pozo and Dorantes (2003), recursive residuals were derived from the weighted least squares regression to diagnose structural change which will guide us in the selection of the optimal *k*.

Figure 7 depicts the recursive residuals for the KLR-EMP index. The recursive residuals are plotted against the bandwith of plus and minus two standard errors, and examination of the recursive residuals in relation to the standard errors show an evident instability, generally, starting at the right-hand side of the plots. When we consider the empirical distribution of the individual ordered EMP indices, the apparent break around the right-hand side of the recursive residual plots appropriately correspond to the optimal choice of *k,* or equivalently, the number of 'extreme' or right-tail observations have now been identified.

Table 3 summarizes the key findings of our empirics. Based on the optimal numbers of *k*, a six-month exclusion window is then adopted to derive the number of crises episodes. The exclusion window is applied to avoid counting the same crisis more than once, especially as a crisis often lasts for over a month and more crises occur in successive months. The last column of Table 3 reports the percentage incidence of the speculative attacks or crisis experienced by the bath according to the KLR-EMP index.[13] Those numbers in general conclusively show that the EMP index based on the real exchange rate of the bath against the yen reported more than twice as many speculative attacks as those reported by the US dollar-baht EMP index.

6. The Crises Dates, and the Political and Economic Events

The last, but interesting task, that we have conducted in this study is to try to associate the dates listed in Table 4 with economic and political events, local or international, that may explain or contribute to the rise in the EMP levels.[14] We break the analyses into two periods: the pre-and post-1997 crisis.

6.1 The Pre-1997 Crisis

Key debates emerged at the beginning of the 1997 financial crisis in Thailand over the "predictability" of the crisis. Was the meltdown of Thai bath in July 1997 an unforeseen event? Could we anticipate it at much early stage? As indicated in the introduction of this study, the principle objective of the construction of the EMP index is to provide us with an early warning indicator.

Based on the crisis dates presented in Table 4, we can confidently argue that the bath has indeed had experienced numerous speculative attacks prior to the 1997 financial crisis. The yen-baht EMP index reported around 10 attacks occurred between 1985 to1996. Five of those attacks had in fact occurred between 1990-1996. Hence, within the last six years prior to the meltdown of the baht in July 1997, every single year with the exception of 1991, the thai currency was under frequent attacks. Clearly, enough warnings of the non-sustainability of the rigid exchange rate policy adopted in that country were available.

In contrast, if we rely only on the US-dollar against bath EMP index, the presence of early warning signals was significantly less. In fact, Table 4 only reported three speculative attacks/crisis episodes from 1985 to 1996. Only two of them occurred between the last six years prior to the 1997 crisis. We can therefore conclude that for a country like Thailand, where a rigid exchange rate of the local

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[13] As shown at the bottom of Table 3, the incidence rate is percentage ratio of the number of crises episodes over the total number of EMP observations (n=225).

[14] As also indicated by Pozo and Dorantes (2003), the listing of political and economic events here is only suggestive of events that may have initiated financial distress. But we have not attempted any causation test in any formal way.

currency against the US dollar was adopted causing an under-representation of another major currency (in this case yen), the EMP index based on the US dollar-baht rate may not be the most reliable early warning indicator.

While the events in 1985-1989 were largely political events, except the one in 1985 (Table 5). But we find between 1990-1996, the speculative attacks were predominantly associated with economic events. Here again, another contrasting results from the two EMP indices are worth discussing. The attacks captured by the US dollar-baht EMP index were only limited to those associated or largely triggered by external events such as the 1990 Gulf Crisis and the fall out of Mexican Peso in 1995.

In contrast, the EMP index based on the baht and yen is more successful in capturing more of the domestic economy shocks, in addition to the international ones, from early to mid 1990s. The sign of troubles in the stock market in Thailand as early as 1993 seems to play a role in explaining attacks on the bath in that year. In addition to the fall of the Mexican peso in 1995, the ensuing flight of capital from the Bangkok stock exchange in early 1995 and concerns over the current account balance in 1996 have arguably created higher pressures and led to more attacks on the baht. The high consumer spending of luxury imports in Thailand heightened uncertainties over the sustainability of the current account deficit and the subsequent adverse implication of the deficit on economic growth (Limpaphayom, 2001).

In summary, the seemingly on-going attacks against the bath starting early 1990s should have provided us with strong signals that the de facto US dollar peg policy was becoming more and more difficult and expensive to sustain. Our general findings are consistent with that of Rajan et.al (2004). They show evidences of misalignments of the bath against the US dollar and the yen. In particular, the misalignment was so much more severe against the yen during the period of 1990-1995.

6.2 The 1997 Crisis and The Post-Crisis Period

The collapse of the Thai bath on that fateful day of July 2, 1997 and the subsequent collapse of the other neighbouring regional currencies had been well documented. As with the pre-1997 crisis period, the yen-baht EMP report a higher presence of speculative attacks than the number suggested by the US dollar-baht EMP index for the post-1997 period. In particular, the yen-baht EMP index was in fact able to capture the presence of attacks during the post-crisis period (in 1999-onward), while the US dollar-baht EMP index was only able to capture the attack during arguably the peak of the East Asian crisis (in 1998). Unlike the pre-1997 period, the events reported in Table 5 for the post-crisis period were mostly associated with the domestic political uncertainties.[15]

7. Brief Concluding Remarks

The experiences of different countries in the world during the past three decades have shown that financial crises are not only likely to occur again, but one should prepare for these unfortunate economic events to occur at a higher frequency, especially as more and more developing economies opening up their capital accounts in the future. As uncertainty in the global economy will likely to remain high, the research works on constructing a reliable early warning crisis index are expected to continue to expand further.

Our paper hopes to contribute to this mammoth task. The main objective of this paper is to investigate the sensitivity of the EMP crisis index to the choice of the "anchor currency". To illustrate our case, we adopt the experience of Thai bath during the past two decades. Given the non-normality of most financial variables,

[15] This finding is consistent with that of Leblang (2001).

including also the EMP index, we have applied the HKKP-extreme value theory estimate for our empirical works.

The test results show that under a rigid exchange regime such as the one adopted by Thailand during the pre-crisis period, an EMP measure of the local currency against one major anchor world currency may not be able to capture the full presence of speculative attacks against that currency. In a case of the Thai baht, our test results show that the EMP of the baht against the US dollar reported substantially less number of the speculative attacks against the baht than the number registered by the EMP of the baht against the yen.

Few closing points are worth highlighting. In any effort to construct an EMP crisis index, it is imperative that we have a comprehensive understanding of the local economy. In the case of Thailand, our findings have shown the significant role of the Japanese market on this country. We also learn that the exchange rate policy adopted by the country during the pre-crisis in particular does not provide an adequate weight to the yen.

Given the knowledge of the economy, the next step is to incorporate the information when constructing the EMP index. To be effective, for countries like most of the Southeast Asian economies, it is recommended to have a number of EMP indices derived based on a number of anchor currencies, including that of the nominal or real effective exchange rate.

Reference:

Andersen, T. G. and J. Lund (1997). "Estimating continuous time stochastic volatility models of the short term interest rate." Journal of Econometrics 77: 343-377.

Baig, T. 2001, 'Characterizing Exchange Rate Regimes in Post-Crisis East Asia', IMF Working Paper WP/01/152, IMF, Washington, D.C.

Bank of Thailand (1998). "Focus on Thailand Crisis." Bank of Thailand Economic Focus.

Benassy-Quere, A (1999). "Optimal Pegs for East Asian Currencies." Journal of the Japanese and International Economies, 13, 44-60.

Beng, G.W. 2000, 'Exchange-rate Policy in East Asia after the fall: how much have things changed?', Journal of Asian Economics, vol. 11, pp. 403-430.

Boothe, P. and Glassman, D. (1987), "The Statistical Distribution of Exchange Rates: Empirical Evidences and Economic Implications", Journal of International Economics, pp. 297-320.

Brenner, R. J., R. H. Harjes, et al. (1996). "Another look at Models of Short-term Interest Rate." Journal of Financial and Quantitative Analysis 31: 85-107.

de Vries, C. G. (1994). Stylized Facts of Nominal Exchange Rate Returns. The Handbook of International Macroeconomics. F. Van der Ploeg, Blackwell Publishers.

Diebold, F., Schuermann, T., and Stroughair, J., 2000, Pitfalls and Opportunities in the Use of Extreme Value Theory in Risk Management, in: P. Embrechts (ed.), Extremes and Integrated Risk Management, Risk Books, U.K.

Eichengreen, B., Rose, A., and Wyplosz, C. 1994, 'Speculative Attacks on Pegged Exchange Rates: An Empirical Exploration with Special Reference to the European Monetary System', NBER Working Paper No. 4898, NBER.

Eichengreen, B., Rose, A., and Wyplosz, C., 1995, Exchange Market Mayhem: The Antecedents and Aftermaths of Speculative Attacks. Economic Policy, 21 (October), 249-312.

Eichengreen, B., Rose, A., and Wyplosz, C., 1996, Contagious Currency Crises: First Tests. Scandinavian Journal of Economics, 98(4), 463-484.

Frankel, J., and Rose, A.., 1996, Currency Crashes in Emerging Markets: An Empirical Treatment. Journal of International Economics, 41, 351-366.

Girton, L. and Roper, D., 1977, A Monetary Model of Exchange Market Pressure Applied to the post-war Canadian experience. The American Economic Review, 67, 4, 537-547.

Goldie, C. M. and R. C. Smith (1987). "Slow Variation with reminder: theory and applications." Quarterly Journal of Mathematics 38: 45-71.

Goldstein, M., G. Kaminsky, et al. (2000). Assessing Financial Vulnerability. Washington D C, Institute for International Economics.

Hernandez, L. and Montiel, P. 2003, 'Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling in the 'Hollow Middle'?', Journal of the Japanese and International Economies, vol. 17, pp. 336-369.

Hill, B.M., 1975, A simple general approach to inference about the tail of a distribution. Annals of Statistics, 3, 1163-1174.

Huisman, R., Koedijk, K.G., Kool, C.J.M., and Palm, F., (2001), Tail-Index Estimates in Small Samples. Journal of Business & Economic Statistics, 19, 1, 208-216.

Ito, T. (1994), On the possibility of a yen bloc , in Glick, R and Hutchison, M (eds), Exchange Rate Policy and Interdependence, Cambridge University Press, USA.

Ito, T., Ogawa, E., and Sasaki, Y.N. (1998), "How Did the Dollar Peg fail in Asia?", Journal of the Japanese and International Economies, 12, pp. 256-304.

Kaminsky, G., Lizondo, S., and Reinhart, C., (1998), "Leading Indicators of Currency Crises". IMF Staff Paper, 45, 1 (March), 1-48.

Kaminsky, G. and Reinhart, C., (1999), "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems". American Economic Review, 89, 3, 473-500.

Kawai, S. and Akiyama, S. 2000, 'Implications of Currency Crisis for Exchange Rate Arrangements in Emerging East Asia', Policy Research Working Paper No. 2502, World Bank, Washington, D.C.

Kawai, S. 2002, 'Exchange Rate Arrangements in East Asia: Lessons from the 1997-98 *Currency Crisis',* Monetary and Economic Studies (Special Edition), Bank of Japan.

Koedijk, K.G., Schafgans, M.M.A, and de Vries, C.G. (1990), "The Tail Index of Exchange Rate Returns", Journal of International Economics, 29, pp. 93-108.

Koedijk, K. G. and C. J. M. Kool (1992). "Tail Estimates of East European Exchange Rates." Journal of Business and Economic Statistics 10(1): 83-96.

Koedijk, K. G., P. Stork, et al. (1992). "Differences between foreign exchange rate regimes: the view from the tails." Journal of International Money and Finance 11: 462-73.

Koedijk, K. G., F. G. J. A. Nissen, et al. (1997). "The Dynamics of Short-term interest rate Volatility Reconsidered." European Finance Review 1: 105-30.

Kwan, C. (1995). "Enken no Keizaigaku (The Economics of the Yen Bloc) (Tokyo: Nihon Keiza Shinbunsha) (in Japanese).

Leblang, D. (2001). "Political Uncertainty and Speculative Attacks". mimeo.

Limpaphayom, P. (2001). "Thailand" in J. Zhuang et al. Corporate Governance and Finance in East Asia, Asian Development Bank.

Mandelbrot, B. (1963). "The Variation of Certain Speculative Prices." Journal of Business XXXVI: 392-417.

Mandelbrot, B. (1964). "New Methods in Statistical Economics." Journal of Political Economy LXXI: 421-440.

Mandelbrot, B. (1967). "The Variation of some other specualtive prices." Journal of Business 36: 394-419.

Mason, D. M. (1982). "Laws of Large Numbers for Sums of Extreme Values." Annals of Probability 10: 754-64.

McFarland, J. W., R. R. Petit, et al. (1982). "The Distribution of Foreign Exchange Price Changes: Trading Day Effects and Risk Measurement." Journal of Finance 37(3): 693-715.

McKinnon, R. (2001), “After the Crisis, the East Asian Dollar Standard Resurrected”, paper presented at the International Conference on “Monetary Outlook on East Asia in an Integrating World Economy” at Chulalongkorn University, Bangkok, on September 5-6, 2001.

McKinnon, R. and Schnabl G. 2002, ‘Synchronized Business Cycles in East Asia: Fluctuations in the Yen/Dollar Exchange Rate and China’s Stabilizing Role’, Institute for Monetary and Economic Studies (IMES) Discussion Paper No. 2002-E-13, Bank of Japan.

Ohno, K. 1999, ‘Exchange Rate Management in Developing Asia: Reassessment of the Pre-Crisis Soft Dollar Zone’, ADBI Working Paper*, 1*, Asian Development Bank Institute, Tokyo.

Pozo, S. and Dorantes, C.A., 2003, Statistical Distributions and the Identification of Currency Crises. Journal of International Money and Finance, 22, 591-609.

Rahmatsyah, T., Rajaguru, G. and Siregar, R. (2002), “Exchange-rate Volatility, trade and “fixing for life” in Thailand.” Japan and the World Economy 14: 445-470.

Rajan, R. and Siregar, R. (2002), “. “Private Capital Flows in East Asia: Boom, Bust and Beyond” , in Gordon. De Brouwer ed., *Financial Markets and Policies in East Asia*, Routledge Press (2002).

Rajan, R., Sen, R. and Siregar, R. (2004), “Misalignment of the Baht and its Trade Balance Consequences in Thailand in the 1980s and 1990s”, The World Economy (forthcoming).

Rogalski, R. J. and J. D. Vinso (1978). "Empirical Properties of foreign exchange rates." Journal of International Business Studies 9: 69-79.

Roll, R. (1970). The Behavior of Interest Rates. New York, Basic Books Inc.

Sachs, J.D., Tornell, A., and Velasco, A., 1996, Financial Crises in Emerging Markets: The Lessons From 1995, Brooking Papers on Economic Activity, 1, 147-215.

Table 1
Descriptive Statistics

	EMP index with $e_{i,t}$ measured per U.S. dollar	EMP index with $e_{i,t}$ measured per Japanese yen
Mean		
1985-1989	-1.535	-1.092
1990-1996	-1.122	-1.212
1997-1998	0.287	-0.190
1999-2003	-0.254	-0.498
Standard Deviation		
1985-1989	2.939	5.013
1990-1996	3.092	4.54
1997-1998	10.054	11.942
1999-2003	1.797	2.554
Skewness	1.30	0.422
Kurtosis	11.08	7.337
Jarque-Bera statistic	675.49*	183.047*

Table 2
Unit Root Tests

	ADF test[a] without trend	ADF test[a] with trend	KPSS test[b] without trend	KPSS test[b] with trend
EMP index with $e_{i,t}$ measured per U.S. dollar	-9.649***	-10.027***	0.512**	0.066
EMP index with $e_{i,t}$ measured per Japanese yen	-15.961***	-15.955***	0.091	0.051

Notes: ***, **, * indicate rejection of the null hypothesis at the 1%, 5% and 10%, respectively.

[a] The ADF procedure test the null that H_0: $y_t \sim I(1)$ against the alternative H_a: $y_t \sim I(0)$.

[b] The KPSS procedure test null that H_0: $y_t \sim I(0)$ against the alternative H_a: $y_t \sim I(1)$.

Table 2B
Ljung Box Q-statistic

EMP index with $e_{i,t}$ measured per U.S. dollar	4.13
EMP index with $e_{i,t}$ measured per Japanese yen	15.0

Notes: the Q-statistic tests the null hypothesis of no autocorrelation at the relevant lag. The results confirm that we cannot reject the null hypothesis.

Table 3
Number of monthly episodes of crises and incidence of crises using the extreme value theory (EVT)

	n	**Optimal *k***	**No. of crises episodes[a]**	**Incidence (in %)[b]**
EMP index with $e_{i,t}$ measured per U.S. dollar	225	15	7	3.1
EMP index with $e_{i,t}$ measured per Japanese yen	225	31	16	7.1

Note: [a]/ using a 6-month exclusion window. [b]/ is calculated by dividing the number of crisis episodes with the number of EMP observations (n) (and then multiply by 100 to get the percentage rate).

Table 4
Crises Dates/Episodes According to Extreme Value Theory

EMP index with $e_{i,t}$ measured per U.S. dollar	**EMP index with $e_{i,t}$ measured per Japanese yen**
February, October 1985	February, October 1985
April 1990	May 1986
Jan. 1995	April, November 1987
February, September 1997	April 1990
June 1998	April 1992
	March 1993
	January 1995
	July 1996
	February, September 1997
	June 1998
	January 1999, August 1999
	March 2000

Note: using a 6-month exclusion window

Table 5
Crisis Dates/Episodes with Corresponding Chronologies of Political and Economic Events/Factors

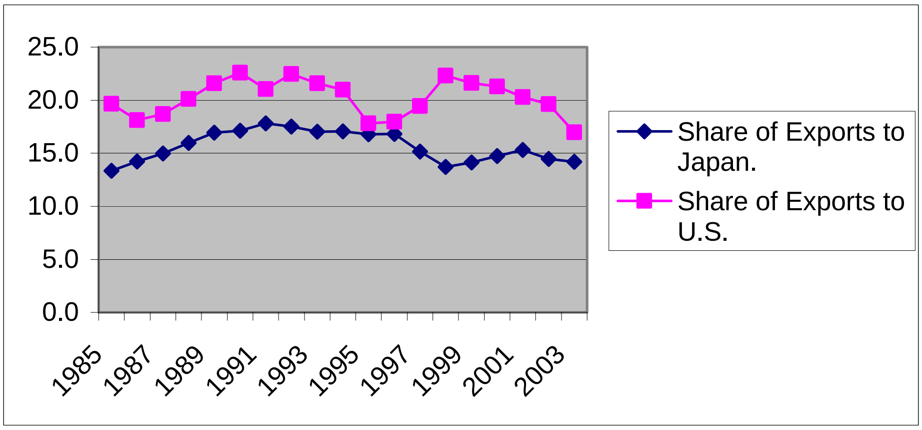
EMP index with $e_{i,t}$ measured per U.S. dollar	EMP index with $e_{i,t}$ measured per Japanese yen	Chronology of economic and political events
February, October 1985	February, October 1985	Ongoing banking crises (1985-1987); failed 15th coup attempt; declining world commodity prices; Gen. Arthit Kamlang-ek's emotional attack on TV against the government; collapse of several high-yielding pyramid fund schemes, e.g., Mae Chamoy; Plaza Accord
	May 1986	Two major scandals rocked the new government of Prime Minister Prem Tinsulanond
	April, November 1987	The very influential Army Commander Gen. Chaovalit Yongchaiyut openly advocates a 'peaceful revolution'
April 1990	April 1990	The Gulf crisis hits
	April 1992	Popular opposition to continued military rule; several antigovernment demonstrators killed and injured; King Bhumibol Adulyadej steps in to stop the violence
	March 1993	Forced admission by the central bank that it had bail out First City Finance, after an alleged stock manipulation scandal by First City; strong demands from the investing public for the resignations of the Securities and Exchange Commission (SEC) secretary-general, central bank governor, and Finance Minister
January 1995	January 1995	Fall out from the Mexican peso devaluation; ensuing capital flight of foreign investors from the Bangkok stock exchange

	July 1996	Decline in export growth; collapsed of the country's most unpopular elected administration of Banharn Silpa-archa
February, September 1997	February, September 1997	Somprasong, first Thai company to miss payments on foreign debt; devaluation of the Thai baht set off the so-called East Asian financial crisis;
June 1998	June 1998	Prime Minister Chuan Leekpai defeats parliamentary vote of no confidence
	January, August 1999	Ruling coalition's image tarnished by allegation of aid fraud and poll rigging
	March 2000	Deputy Prime Minister and Interior Minister, Sanan Kachornprasart, resigns following inquiry into his personal wealth; Chavalit Yongchaiyudh, leader of main opposition party, leads mass resignation from lower house, in bid to force early general election

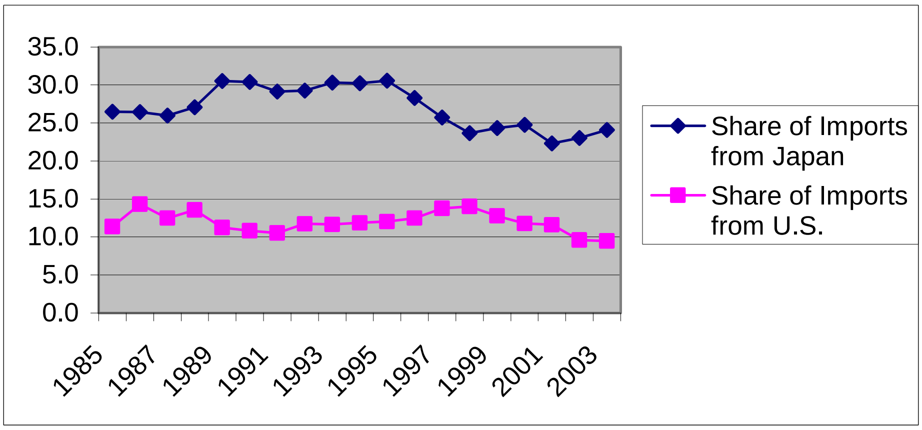
Sources: Economist Intelligence Unit (EIU). Country Report published by The Economist (various years);http://www.encyclopedia.com; http://www.duke.edu/~charvey/Country_risk/couindex.htm; http://asiapacific.ca/data/chronology/index.cfm; Asia Yearbook published by the Far Eastern Economic Review (various years); http://news.bbc.co.uk/1/hi/world.default.stm

Figure 1

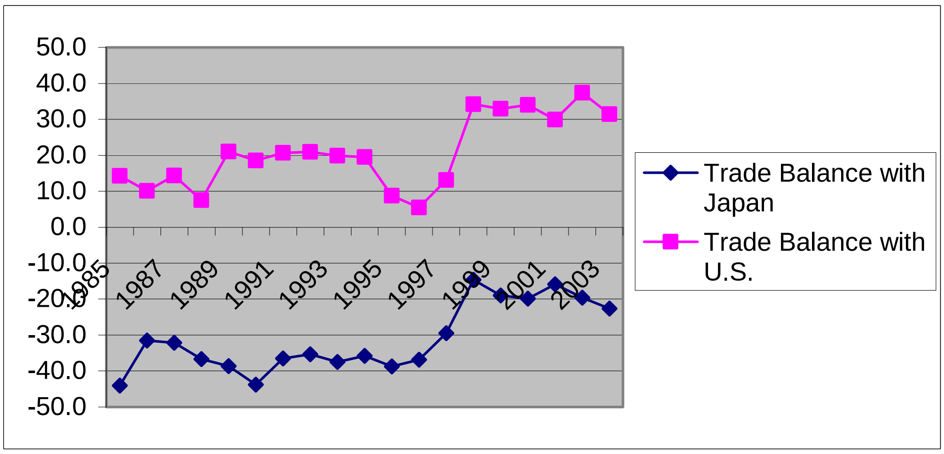
Panel A: Percent Share of Thailand's Exports to Japan and U.S.



Panel B: The Percent Share of Thailand's Imports from Japan and U.S.



Panel C: The Trade Balance with Japan and U.S. (Percent Share)



Note: the negative number implies deficit

Figure 2
Percent Share of U.S. and Japanese Direct Investment Inflows into Thailand, 1985-2003

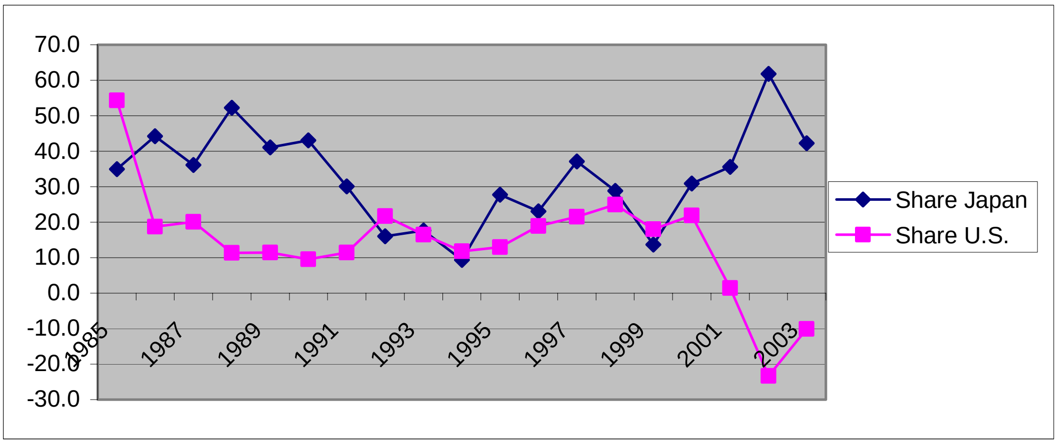


Figure 3
Percent Share of U.S and Japanese banks providing loans to Thailand, 1985-2003

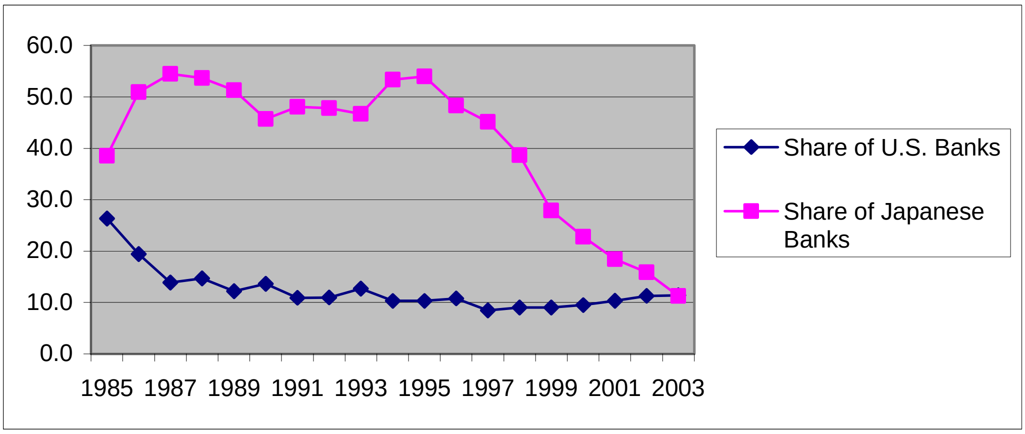


Figure 4
Currency Composition of long-term debt to Thailand, 1985-2000

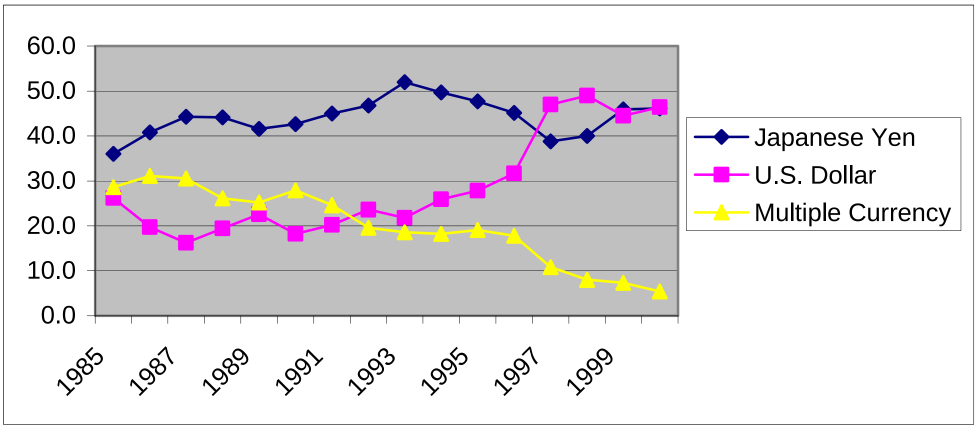
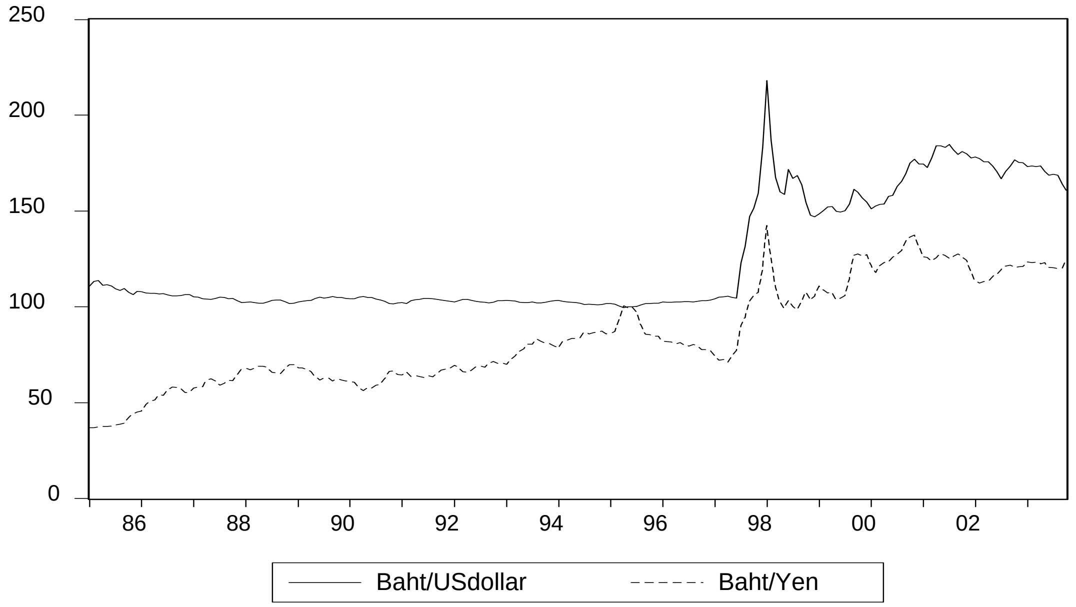


Figure 5

Panel A: Nominal Exchange Rate (baht per relevant foreign currency) (June 1995 = 100)



Panel B: Real Exchange Rate (baht per relevant foreign currency) (June 1995 = 100)

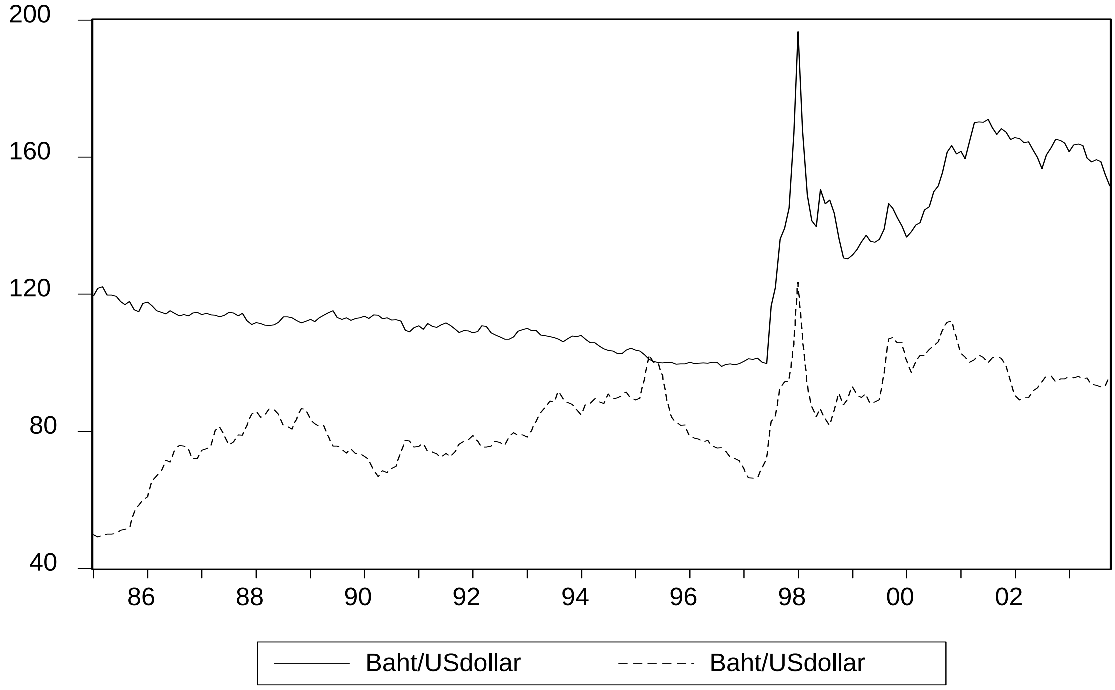
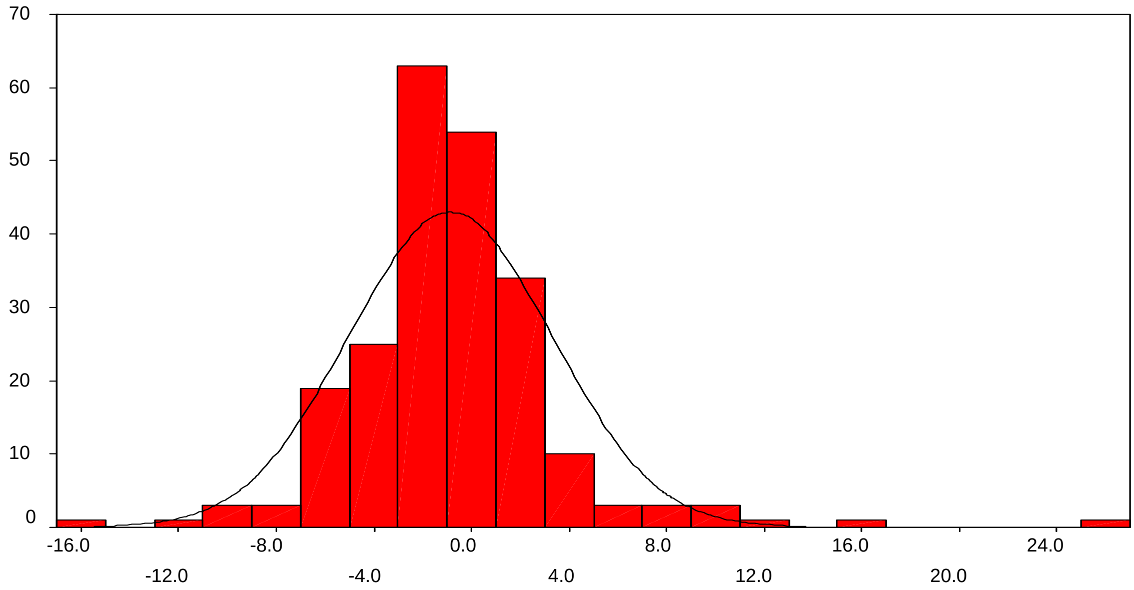


Figure 6: Histogram of EMP and Corresponding Normal Probability Density Function

Panel A: EMP index with $e_{i,t}$ measured per U.S. dollar



Panel B: EMP index with $e_{i,t}$ measured per Japanese yen

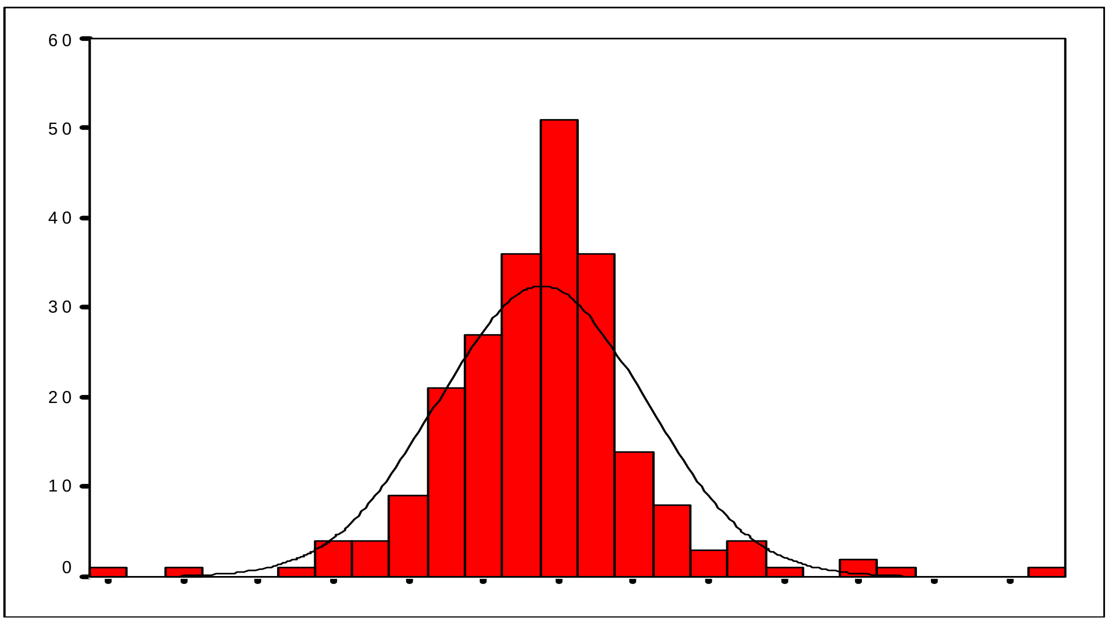
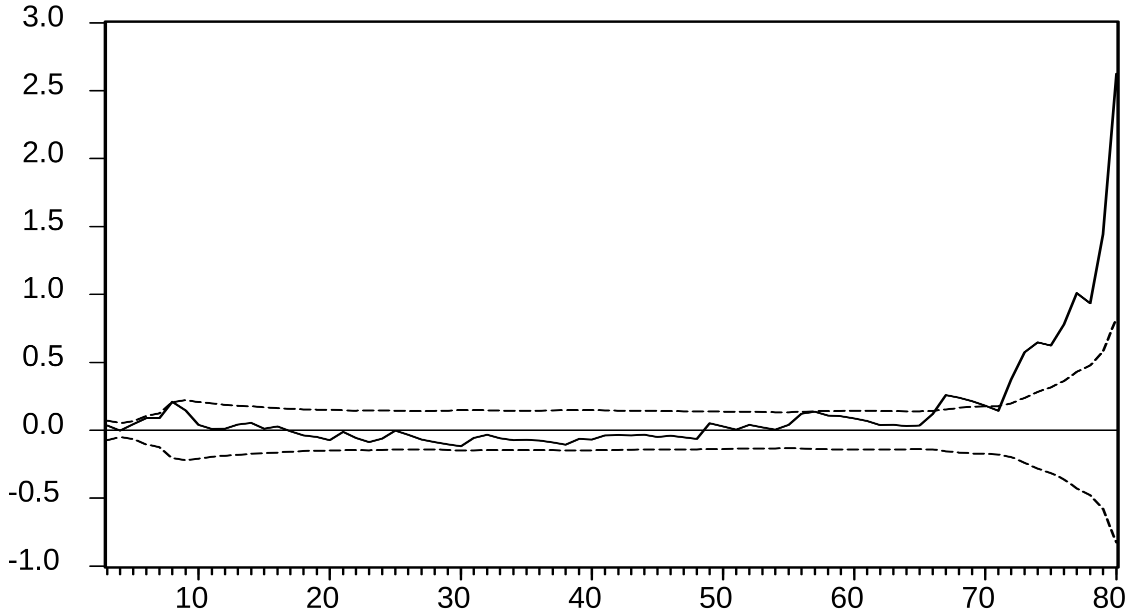
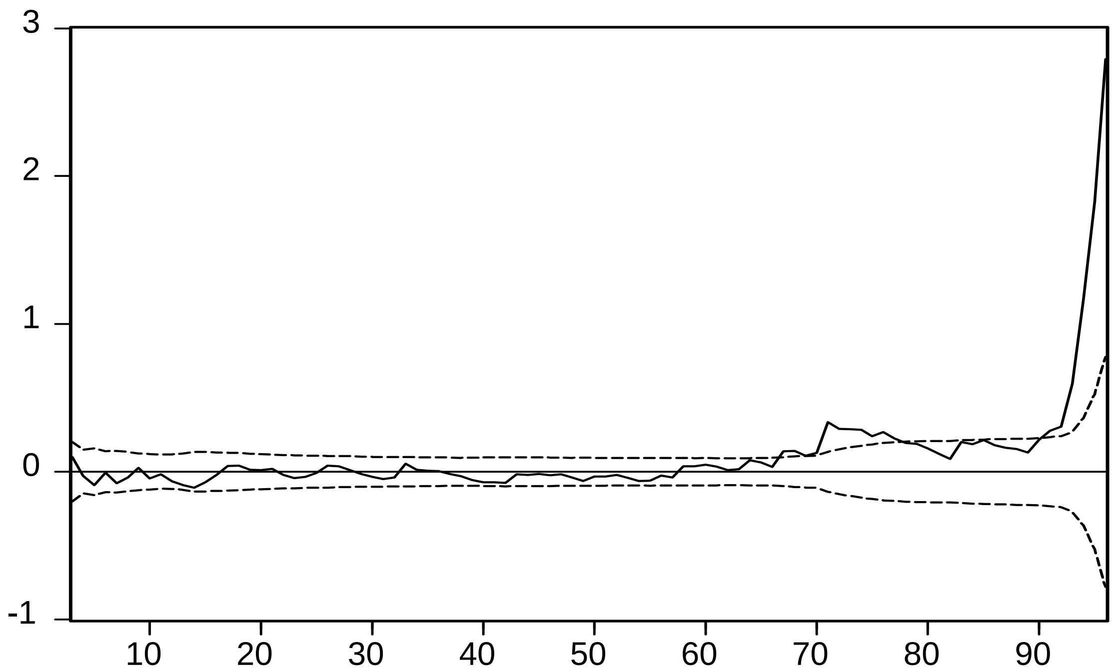


Figure 7
Recursive Residuals

Panel A: With $e_{i,t}$ measured per U.S. dollar



Panel B: With $e_{i,t}$ measured per Japanese yen



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