Centre for International Economic Studies

Discussion Paper
No. 0504

Incidences of Speculative Attacks on Rupiah During The Pre- and Post-1997 Financial Crisis

Reza Y. Siregar & Victor Pontines

May 2005

Indonesia Program

University of Adelaide
Adelaide 5005 Australia

CENTRE FOR INTERNATIONAL ECONOMIC STUDIES

The Centre was established in 1989 by the Economics Department of the Adelaide University to strengthen teaching and research in the field of international economics and closely related disciplines. Its specific objectives are:

- to promote individual and group research by scholars within and outside the Adelaide University
- to strengthen undergraduate and post-graduate education in this field
- to provide shorter training programs in Australia and elsewhere
- to conduct seminars, workshops and conferences for academics and for the wider community
- to publish and promote research results
- to provide specialised consulting services
- to improve public understanding of international economic issues, especially among policy makers and shapers

Both theoretical and empirical, policy-oriented studies are emphasised, with a particular focus on developments within, or of relevance to, the Asia-Pacific region. The Centre's Director is Reza Y. Siregar (reza.siregar@adelaide.edu.au).

Further details and a list of publications are available from:

Executive Assistant
CIES
School of Economics
Adelaide University
SA 5005 AUSTRALIA
Telephone: (+61 8) 8303 5672
Facsimile: (+61 8) 8223 1460
Email: cies@adelaide.edu.au

Most publications can be downloaded from our Home page: http://www.adelaide.edu.au/cies/

ISSN 1445-3746 series, electronic publication

CIES DISCUSSION PAPER 0504

Incidences of Speculative Attacks on Rupiah During The Pre- and Post-1997 Financial Crisis

Reza Y. Siregar
(Corresponding author, e-mail: reza.siregar@adelaide.edu.au)
The Center for International Economic Studies (CIES), and
The School of Economics, University of Adealide, SA 5005, Australia

and

Victor. Pontines
(e-mail: victor.pontines@adelaide.edu.au)
The School of Economics, University of Adelaide, Adelaide, SA 5005, Australia

Draft: May 2005

(This paper is a forthcoming chapter at (ed. Anwar Nasution), "*Indonesian Economy After the Crisis: Economic Policy Under Democracy*, the Institute of Southeast Asian Studies, Singapore).

Incidences of Speculative Attacks on Rupiah
During The Pre- and Post-1997 Financial Crisis

Abstract:

The objective of this study is to identify and date the episodes of high speculative attack periods against the Indonesian rupiah over the last fifteen years (i.e. from 1985 to 2003). From the findings, we hope to address the following set of questions. Had rupiah indeed been stable prior to its meltdown in the third quarter 1997? Arguably a more relevant question to be addressed at this point is whether the rupiah has stabilized, as measured by a relatively moderate EMP index, since its worst fall in late 1997? This study also hopes to introduce a simple measurement index to detect the presence of market pressures in the foreign exchange market, and to illustrate a reliable methodology to estimate a "threshold" separating low market pressures from the extreme ones.

Key Words: F31, F41

JEL Classification: Currency Crisis; Exchange Market Pressure; Speculative Attacks; Extreme Value Theory; Rupiah.

1. Introduction

Concerted speculative attacks on the regional currencies have long been underlined as one of the key features of the past incidences of financial and currency crises in various corners of the world during the past three decades, including that of the 1997-financial crises in East Asia. Going back to the three generations of currency crises models, one can find different insights to the contributing factors of the currency crises of 1970s, 1980s, early 1990s and the East Asian currencies in late 1990s, such as deterioration of economic fundamentals, inconsistency of government policy and self-fulfilling market expectations.[1] However, despite their fundamental differences, each of these models consistently highlight the important role of speculative attacks in carrying out the final blows to the currencies of the crisis-effected economies.

The objective of this study is to identify and date the episodes of high speculative attack periods against the Indonesian rupiah over the last fifteen years (i.e. from 1985 to 2003). From the findings, we hope to address the following set of questions that have a number of pertinent policy implications. The most basic one is on the stability of rupiah during the pre-1997 financial crisis period. Had rupiah indeed been stable prior to its meltdown in the third quarter 1997? If it is found that the rupiah-US dollar rate were under frequent and severe speculative attacks in late 1980s and early to mid-1990s, one can therefore argue that there had been early warnings highlighting the fragility of the currency, and hence the meltdown of rupiah in 1997 should have been more promptly anticipated.

Arguably a more relevant question to be addressed at this point is whether the rupiah has stabilized since its worst fall in late 1997? Based on understanding of the severity and the frequency of the market pressures/speculative attacks against the

[1] Refer to Krugman (1979), Obstfeld (1996), Sachs, Tornell and Velasco (1996), and Williamson (2004) for further elaborations on the three generations of the currency crisis models.

rupiah during the post-1997, we should be able to conclude whether rupiah has indeed stabilized and to date the beginning period of the stability of rupiah. Moreover, we may find that the market pressures against rupiah during the last two years of our observation period (2002 and 2003) for instance to be less than the average rate at the peak of the 1997 crisis (i.e. 1998-1999). Yet, the average market pressures during the post-1997 crisis period were in average still higher than the rate of the pre-1997 period. Thus despite the evidences of the returns of a more stable rupiah, one needs to add a caveat here that the local currency remained more fragile in the recent years than during the pre-1997 period.

It is also important to note here that the relevance of the empirical works conducted in this study is not only limited to understand the ex-post fluctuations of the rupiah. But it also hopes to illustrate a relatively simple approach to generate a reliable measurement index to detect the presence of market pressures in the foreign exchange market. This index is inarguably useful, especially for the decision making process and the operation of monetary policy in the future. In 1999, a new central bank law was enacted. Although the law does not explicitly call for the use of inflation targeting as the key objective of the monetary policy in Indonesia, Alamsyah, et.al (2001) list several stylised facts that lead them to justify the adoption of explicit inflation targeting by the central bank. To achieve the targeted low inflation rate, a stable local currency has arguably been pushed forward as one of the important pre-requisites (Calvo and Reinhart (2004)). Naturally, the ability of the monetary authority to gauge the ups and downs of the market pressures / speculative attacks against the rupiah is therefore very critical for the overall success of its operations.

To address the previously listed key policy questions, we need, first and foremost, to construct a proper and reliable measurement for examining the stability of the rupiah. This paper hopes to highlight a number of recent developments on both economic theory and methodology to construct the necessary measurement or indicator for identifying the presence of high market pressures or speculative attacks against a currency.

A large number of studies have emerged starting mid-1990s attempting to construct a single market index that would signal the presence of the market pressures on the exchange rate (EMP) of a currency on a timely manner. Some of these notable studies include the works of Eichengreen, Rose and Wyplosz (1995, 1996) on the ERM currency crises of 1992-1993; Sachs, Tornell and Velasco (1996) on the Mexican or Tequila crisis of 1994-1995; and Kaminsky, Lizondo and Reinhart (1998) on the 1997 East Asian currency crisis. Despite few but relatively minor differences on the constructions of the EMP index, all of these studies agree that the volatility of the local currency does not adequately signal the presence of high market pressures in the economy. 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. Therefore, combining them should convey a more informative and reasonable measure of the extent of currency crises, and referred to as the index of exchange market pressure (henceforth known as EMP index).

Having constructed the “signalling index”, the next natural step is to address the issue of “crisis threshold”. It is widely known that the foreign exchange market is generally characterized by its frequent turbulences or volatilities. It is however arguably inappropriate to suggest that the market watchers and the policy makers should treat any daily volatilities or market pressures as signals for the presence of concerted efforts to speculate against the local currency. The question is at what stage the EMP should be considered very high and thus signals the presence of strong speculative attacks against the local currency.

For most of early studies (and some recent works), the convenient construction of thresholds, often involving arbitrary multiples of the standard deviation of the EMPs to be above its mean, has become the usual fashion of choice.[2] Our paper will show that a careful examination of the basic statistical distribution of the measures of exchange market pressure will reveal that the conventional method of defining currency crisis is statistically flawed or inaccurate in capturing the 'true' dispersion of any given exchange market pressure series. The conventional method of employing the mean and the standard deviations is found to underestimate the frequency of the speculative attacks. Most importantly, we will also show that due to the non-normality of the statistical distribution of the EMP indices in general, we have to simply avoid relying on any parametric assumptions in identifying the threshold. Accordingly, our study will apply the Extreme Value Theory (EVT). To avoid the potential problem with the small sample when calculating the tail parameter of the Hill estimate (1975), we will adopt the tail index estimator proposed by Huisman, Koedijk, Kool, and Palm (2001) ---henceforth HKKP---, which is unbiased in small sample.

Next section of the paper will briefly review the trends and stylised facts on the local currency of Indonesia. Section three will then introduce the basic construction of the Kaminsky, Lizondo and Reinhart (KLR) exchange market pressure index. In this section also, the concepts of EVT and the HKKP test will be introduced. The analyses of the test results will be presented in section four. A brief concluding section will then end the paper.

[2] Studies have usually adopted 1.5, 2, 2.5, or even more multiples of the standard deviation as their choices. See Frankel and Rose (1996).

2. Trends and Stylised Facts on Rupiah

2.1 Period of Stability: 1985-1996

In November 1978, following a major devaluation of the rupiah from its seven-year U.S. dollar peg of Rp415.00 to Rp625 per U.S. dollar, Bank Indonesia (henceforth BI), the central bank of Indonesia, formally shifted its exchange rate policy to a basket-pegged using as its basket the currencies of the country's major trading partners. Furthermore, with the drastic decline in the world crude oil prices and the rate of inflation averaging double-digit throughout the early 1980s, the Indonesian economy would endure two more major devaluation episodes in 1983 and in 1986.

Exchange rate management policy in Indonesia would play a vital role in supporting an extensive liberalisation and reform packages undertaken by the local government that ranged from the deregulation of the financial sector, reductions in various import tariffs, provision of investment incentives, and in the promotion of the country's non-oil export sector starting mid-1980s (Siregar, 1999). In order to ensure the competitiveness of the latter, BI considers the inflation differential between the domestic rate and the rates of its major trading partners as the main factor in the setting of the official nominal exchange rate. For instance, as is clearly evident from Figure 1, when one takes into account the ratio of the CPI in Indonesia to that of the CPI in the U.S., it is without a doubt that the domestic price level has continuously been rising faster than in the United States. Accordingly, as depicted in Figure 2, throughout the early and the mid-1990s, Bank Indonesia permitted a gradual or 'crawling' annual depreciation of the nominal rupiah rate against the U.S. dollar and its intervention bands. In doing so, the central bank managed to keep the real exchange rate of the rupiah fairly stable.

More importantly, evidences captured in Figures 1 and 2 confirm widely held and credible documented claims that the rupiah was in a *de-facto* crawling-band throughout the 1990s until this was abolished at the height of the East Asian crisis in August 1997. It is interesting to note as well that there were eight times in the 1990s prior to August 1997 and six times altogether, within the period of January 1994 to September 1996 that BI cautiously exercised steps to widen this band (Williamson, 1998; Djiwandono, 2000) (see Table 1).

2.2 Turbulent Period: 1997-2003

The severe speculative attack on the eve of August 1997, a month after Bank Indonesia had just widened the trading band from 8 to 12 percent, led to an involuntary abandonment of the pre-crisis exchange rate policy and with it the scrapping of the intervention bands and the forced adoption of a 'crisis float'. As clearly shown in Figure 2, the sharp spikes in both the nominal and real rate of the rupiah for the rest of 1997 and throughout 1998 would clearly have detrimental effects on corporate balance sheets and the subsequent bankruptcies on a large-scale. From the rate of around 1US$=Rp.2380 in January 1997, the rupiah depreciated to its lowest rate at around 1US$=Rp15000 in June 1998.

Though the rupiah had eventually recovered and appreciated to as high as 1US$= Rp6700 in June 1999, the currency however remained very volatile during the post-1997. To estimate the volatility rates of rupiah, we employ different types of ARCH models. The GARCH specification that we consider takes the form:

$$\ln NER_t = a_0 + a_1 \ln NER_{t-1} + e_t \text{, where: } e_t \sim N(0, h_t) \quad (1)$$

$$h_t = \alpha + \beta e_{t-1}^2 + \gamma h_{t-1} + u_t . \quad (2)$$

Where: $(LnNER_t)$ is the nominal exchange rate of rupiah against the US dollar in the log-form.

The conditional variance equation (Equation 2) described above is a function of three terms: (1) the mean α; (2) news about volatility from the previous period, measured as the lag of the squared residual from the mean equation: e_{t-1}^2 (the ARCH term); and (3) the last periods forecast error variance, h_{t-1} (the GARCH term). The test is done on monthly rupiah rates from January 1987 to December 2003. The GARCH conditional variance will give us the estimate of the size of volatility of rupiah during the observation period. Different types of ARCH models such as ARCH, GARCH and EGARCH models were estimated on the data. However, only the GARCH(1,1) models are found to be superior in generating the volatility for the rupiah nominal exchange rates against the US dollar.[3]

Several interesting numbers are worth highlighting. At its peak, the average monthly volatility of the USD-Rp rate from January 1998 to July 1998 was more than 200 times higher than the average from January 1997 to June 1997 (Figure 3). The GARCH(1,1) conditional variance also shows that the volatility rate declined substantially starting 1999. From January 2000 to December 2003, the average volatility rate was only (0.03) of the rate for the first six months of 1998, but the rate since January 2000 was still about 60 times higher than the reported rate during the first six-months of 1997.

What is perhaps the most interesting aspect of the exchange rate policy in Indonesia after the crisis is to render an accurate description of its actual exchange rate policy.[4] According to its website, after the crisis, BI described its exchange rate policy as a free float exchange rate since August 1999.[5] Furthermore, the website also indicates

[3] The GARCH(1,1) test results can be made available upon request to the author.
[4] This argument comes from a certain consensus among policymakers and academics alike that before the crisis, the crisis-hit East Asian countries including Indonesia declared official exchange rate regimes that were not in conformity with their actual exchange rate policy, i.e., the so-called discrepancy between *de-jure* and *de-facto* exchange rate regimes mentioned earlier in the discussion.
[5] www.bi.go.id.

that in order to maintain a stable exchange rate, the monetary authority performs sterilization (intervention) in foreign exchange market at a certain period of time, especially during an irregular fluctuation of the exchange rate. Under the IMF classification of exchange arrangement until end-of-March 2001, Indonesia is classified as an independent float. The IMF defines an independent float as an arrangement where "the exchange rate is market-determined, with any foreign exchange intervention aimed at moderating the rate of change and preventing undue fluctuations in the exchange rate, rather than establishing a level for it (various IMF Annual Reports).

However, this statement alone makes it inconsistent with the standard textbook definition of a clean float. Though, since December 2001 to the present, the BI had changed from an independent float to a managed float based on the IMF's official classification, distinguishing between a managed float and an independent float is not that entirely clear.[6]

According to estimates conducted by Pontines and Siregar (2005) on probabilities of intervention by the BI from the period of 1985 to 2003, and substantiated by official publications released by the BI,[7] the central bank resorted to a prolonged defence of the rupiah since early 1999, which moderated somewhat for most of 2000, which again resumed in 2001. Beginning in 2002 until the end of 2003, BI had allowed some greater flexibility to the rupiah. In view of these results, and insofar as the distinction between a managed float and an independent (free) float is concern, it seems that, on average, Indonesian post-crisis exchange rate policy resembles more like of a managed float rather than a free-float.

---

[6] The IMF defines a managed float as "the authorities influence exchange rate arrangements through interventions to counter the long-term trend of the exchange rate, without specifying a predetermined path, or without having a specific exchange rate target.

[7] On this refer to Chapter 3 of the 2000, 2001, 2002, 2003 Annual Reports of the Bank of Indonesia.

3. Exchange Market Pressure Index and Crisis Threshold

As briefly discussed, the exchange rate is said to be under “stress” or “under speculative attack”, if there is a significant increase in the market pressure on the exchange rate of the currency. The speculative attacks are not only defined as capturing instances of successful ones, i.e., when a 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). The seminal idea is 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 or the high market pressure on the exchange rate can be repelled or warded off through raising interest rates and/or running down on the foreign exchange reserves.

An exchange market pressure (EMP) index can be constructed as a weighted average of the changes in exchange rate, in foreign exchange reserves, and in interest rates. The question is how to weigh the three components of the index of speculative pressure.[8] Next, we will briefly review one of the recent works on EMP indices that will then be adopted for our empirical analysis.

3.1 Kaminsky, Lizondo and Reinhart Exchange Market Pressure Index

The original construction of the exchange market pressure (EMP) of Kaminsky, Lizondo, and Reinhart (KLR) (1998) and Kaminsky and Reinhart (1999) did mention the need to consider the role of interest rate, but due to various constraints, mostly with the

[8] 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 (especially at the presence of extreme/high market pressures to sell the local currency) .

interest rate data, they decided not to include the interest rate component. [9] In the case of Indonesia, the role of interest rate as a monetary policy instrument to stabilize the local currency, especially during the peak of the crisis in 1998, was highly visible. Given this stylised fact of the economy, we modified the standard KLR-EMP index to include the interest rate variable:

$$EMPI_{i,t} = \frac{\Delta e_{i,t}}{e_{i,t}} - \frac{\sigma_e}{\sigma_r}\frac{\Delta r_{i,t}}{r_{i,t}} + \frac{\sigma_e}{\sigma_i}\Delta i_{i,t} \qquad (3)$$

where: $EMPI_{i,t}$ is again 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 in period *t*; $r_{i,t}$ gross foreign reserves of country i in period *t*; $i_{i,t}$ the nominal interest rate for country *i* in period *t*; σ_e the standard deviation of the rate of change in the exchange rate ($\frac{\Delta e_{i,t}}{e_{i,t}}$); σ_r is the standard deviation of the rate of change in reserves $\left(\frac{\Delta r_{i,t}}{r_{i,t}}\right)$; and σ_i the standard deviation of the change in the nominal interest rate, $\Delta i_{i,t}$.

From equation (3), 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_i 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.

[9] Kaminsky and Reinhart (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).

3.2 Extreme Value Theory

Once we calculate the EMP indices, the next step is to determine the threshold for separating the episodes of crises from the full observation samples. As briefly discussed, 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 commonly used Hill (1975) estimator where 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 $i = 2, \ldots\ldots, n$. Suppose that we opt to include k observations from the right tail in our estimate. Hill (1975) proposed the following estimator for γ:

$$\gamma(k) = \frac{1}{k} \sum_{j=1}^{k} \ln(x(n-j+1) - \ln(x(n-k)) \qquad (4)$$

where: k is the pre-specified number of tail observations. 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:

$$\gamma(k) = \beta_0 + \beta_1 k + \varepsilon(k)\,, \qquad k = 1, 2, \ldots, \kappa \tag{5}$$

where $\varepsilon(k)$ 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 (5), HKKP(2001) adopt the Weighed Least Square (WLS), instead of the Ordinary Least Squares (OLS), to deal with the potential heteroscedasticity in the error term $(\varepsilon(k))$ of Equation (5). The weight has $\left(\sqrt{1}, \sqrt{2}, \ldots\ldots \sqrt{k}\right)$ as diagonal elements and zeros elsewhere. The estimate of γ from the WLS regression is an approximately unbiased estimate of the tail-index.

4. Result and Analyses

4.1 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 Indonesian rupiah per U.S. dollar. To capture the periods of relatively higher inflationary pressures, a measure of the real exchange rate is adopted in the calculation of the EMP index. The real exchange rate is calculated by multiplying the nominal exchange rate by the relative price given as:

$$RER_t = (NER_t) * \left(\frac{P_t^{US}}{P_t} \right) \quad (6)$$

where: P is the consumer price index of Indonesia, and P^{USA} is the U.S. consumer price index. An increase in RER_t (real exchange rate) or NER_t (nominal exchange rate) implies an appreciation of the U.S. dollar against the Indonesian rupiah.

The remaining data requirements in the construction of the exchange market pressure indices are as follows. A measure of the interest rate differential is defined as the difference between the domestic interest rate and the U.S. federal fund rate, with the overnight money market rates used as the measure of domestic interest rate. Line 11 of the IMF-IFS database (foreign assets of the monetary authorities) was used as the measure of foreign exchange reserves.

4.2 The shortcoming of the Conventional methodology.

A number of interesting analyses can be generated out of the empirical exercises presented in section three. To start with, Figure 4 clearly shows the period of high market pressure against the rupiah during the last 15 years. Since we are interested only on the high positive value of EMP (Equation 3), the extreme values are found to be around the period of the 1997 financial crisis. The relatively more moderate ones are also reported in late 1986. With the exception of these two periods of high EMP index in the past two decades, it is arguably difficult, based on looking at Figure 4, to make any conclusive analysis for the rest of observation periods. What level of threshold should be imposed? How do you derive the threshold?

One simple way is to adopt the conventional method, whereby one may fix one or more standard deviations above the mean of the series as a threshold. Obviously the problem here is how many standard deviations should one apply for the threshold?

Applying two standard deviations will give us a different set of high EMP episodes than when three standard deviations are applied. As reported in Table 2, the application of the conventional method on the EMP of the Indonesian rupiah gives us the highest number of episodes of speculative attacks only when we adopt 1.5 standard deviations above the mean.[10] Thus, the outcome of the conventional process of selecting the threshold is arguably not a robust one.

The primary shortcoming of the conventional method lies with its basic assumption that the series is normally distributed. However, as reported in Table 3, the null hypothesis of a normally distributed EMP index is rejected based on the Jarque-Bera statistics. A similar conclusion can also be derived based on Figure 5, where the histogram of the rupiah EMP series overlaid by its corresponding normal probability density functions. It is obvious that the EMP index departs significantly 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.

As discussed, by adopting the HKKP-Extreme Value Theory, we do not have to arbitrarily select the threshold level and rely on the assumption that the series must be normally distributed. Based on the true distribution of the EMP series observed during the period of 1985-2003, the HKKP testing provides us with a number of "extreme-values of the computed EMPs". Before we conduct the actual HKKP-EVT test, the unit-root property of the EMP series must first be tested. The series is found to be stationary (Table 4). To ensure the unbiasedness of the weighted least square (WLS) test result, the Ljung-Box autocorrelation test is also conducted. Table 5 indicates that the null-hypothesis of no autocorrelation can be rejected.

[10] We tested also for one, two and three standard deviations. The results are not posted in the paper, but they can be made available upon a request to the authors.

As discussed, 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) –shown in Equation 5. Although asymptotically unbiased, the Hill estimator is biased in relatively small samples. In accordance with the suggestion of HKPP (2001), to deal with the estimation of the tail with a small sample size, we use equation (5) in estimating a weighted least squares (WLS) regression, after computing the $\gamma(k)$ for a range of values of k.[11] Consequently, the essence is to identify the right-tail outliers or 'extreme value' observations since the right-tail distribution of any EMP index ordered distribution will automatically determine the number and incidence of currency pressure episodes that the rupiah experienced during the observed period. Accordingly, as suggested by Diebold, Schuermann, and Stroughair (DSS) (2000) and employed by Pozo and Dorantes (2003), the 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 6 depicts the recursive residuals from our computed EMP index. The recursive residuals are plotted against the band-with of plus and minus two standard errors. When we consider the empirical distribution of the ordered EMP index, 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 6 reports 26 numbers (k) of high EMPs, which translates into 16 or 13 periods of high market pressures or speculative attacks against the rupiah, depending on the number of exclusion period (three or six months). Given the fact that high speculative attacks could last for months, a standard process is to impose the exclusion

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

window to avoid double counting the number of attacks. So a three-month window for instance implies that three consecutive months of high EMP index will be counted as one episode of crisis or extreme market pressure period. Comparing the number of speculative attacks on the foreign exchange market reported in Tables 2 and 6, we can clearly conclude that the conventional method of applying the mean and standard deviation has underestimated the frequencies of attacks on the rupiah during the past 15 years.

4.3 The Dates and the Events

Once we identify the incidences of high speculative attacks/currency crises, it is relatively straightforward to date the starting period of each of those events. To provide more conclusive analyses, we try to associate the dates with economic and political events, local or international, that may contribute to the rise in the EMP levels. 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 the financial distress on the rupiah. But we have not attempted any causation test in any formal way.

The dates and the events from the Extreme Value Test are posted in Table 7. From the results, it is apparent that about 10 years before the outbreak of the 1997 financial crisis in East Asia, the rupiah has indeed been under attacks/selling pressures at least around eight times. The last significant attack occurred in late 1995. In general, these attacks were not successful in causing major depreciations of the rupiah or triggering massive financial crises, as in 1997. However, despite its stable nominal rate, shown in Figure 2, during the period of 1986-1996, the Indonesian rupiah was frequently exposed to speculative pressures in the foreign exchange market. Only through the active interventions of the monetary authority that any of those pre-1997 attacks did not cause any further severe and adverse impacts on the local economy.

Another interesting point to highlight from Table 7 is on the natures of the events. Under the strong rules of President Suharto, political uncertainties arguably did not contribute significantly to the attacks against the rupiah during the pre-1997 period. Most of the events in 1980s and early to mid-1990s were associated with local and international economic events. The rapid reforms of the financial sector during the late 1980s in particular, with the opening of the banking sector and the capital market, have brought about a significant increase in investment in the local economy, especially portfolio investments. Coupled with the lack of transparency and genuine structural reforms, the rapid opening of the capital account led to a number of banking failures/scandals in 1990 and 1994, and triggered selling pressures on the rupiah.

In addition to local events, the turbulences on the international foreign exchange market have also been responsible to speculative pressures against the rupiah. The drastic drop in oil prices in 1985 and 1986, and the Mexican peso crisis of 1995 have shown that the Indonesian rupiah was exposed to the uncertainties in the global market. This confirms the high degree of integration of the Indonesian market with global markets, and the increasing susceptibility of the Indonesian rupiah to adverse developments in international markets.

In contrast, post-1997 events were largely driven by political uncertainties in the country. The dismissal of President Suharto in early 1998 and President Abdurrahman Wahid in 2001 worsened an already politically tense situation in the country. One can argue that the struggle for political stability has contributed significantly to weak market confidences on the local currency during the post 1997 period.

4.4 The severity of the attacks and the return of a stable rupiah.

From table 7, our empirics found no evidences of high market pressures against the rupiah from January 2002 to the end of our observation period of December 2003.

Thus, this enables us to conclude that the period of a relatively stable local currency in Indonesia is only reported almost five years after the initial outbreak of the 1997 financial crisis.

There is one more interesting observation that can be reported from our empirical results. Table 8 ranks the dates of speculative attacks based on its severity, reflected by the size of the EMP index. It is shown that the period of post-1990 has seen in general more severe attacks or higher market pressures against the rupiah than during the period before that. With the exception of the EMP size for November 1986 crisis episode, the top five most severe crisis episodes in general occurred during the post-1990. As should also be re-emphasized here, with a more globally integrated domestic market, the local currency has increasingly been exposed to the high volatility in international currency markets, and therefore will likely be subjected to more frequent and severe speculative attacks.

5. Conclusion

Our study examines the incidences of high market pressures, reflecting the presence of speculative attacks, against the rupiah from 1985 to 2003. Instead of narrowly relying on the fluctuations of the nominal exchange rate, we adopt the commonly used concept of exchange market pressure (EMP) index. The application of the HKKP Extreme Value Theory methodology is also employed to generate a more appropriate and consistent threshold to separate the high market pressure periods from the low ones. From the empirical testing, several key findings have been underlined and analysed in the previous section.

More should be done in future research works to understand the speculative attacks on the local currency. One extension is to consider real exchange rates of the Indonesian rupiah against other major world currencies, such as the yen and the euro, in the construction of the EMP index. With the role of the US dollar had been found to be very significant in influencing the movements of rupiah, especially during the period of 1986-1996 as shown in Figures 1-2, the rate of the rupiah against the yen has in average been found to be significantly more volatile that the rupiah against the US dollar rate (Siregar and Rajan (2004)). Given the high interdependence of the Indonesian economy with the Japanese market and the greater volatility in the rupiah-yen rate, one should expect to find more incidences of speculative attacks against the rupiah.

Extending on our analyses in the previous section, further researches should also evaluate the rise and fall in the EMP index. The focus should, in particular, be to examine the driving factors behind the incidence of market attacks against the rupiah. What can explain the absence of high market pressures during the period of 2002 and 2003? Was it largely due to "sounder domestic economic fundamentals" as a result of a number of both economic and political reforms initiated during the post-1997 crisis period? Or has it also been partly due to the fact that the country experienced substantially more moderate flows of portfolio capital in the last few years as foreign investments in the economy in particular remained very weak, especially when compared to the period of mid-1990s?

The annual average rates of approved foreign and domestic investment during the peak of the financial crisis (1998-1999) were less than 40 percent and 60 percent of the average rates between 1995-1997, respectively. The sharp fall in the approved amount of direct investment has also been further worsened by the low realization rate of the investment. Official reports indicate that only less than 50 percent of the approved domestic and foreign investments were eventually realized between 2000-2004.[12] If the weak investment is found to be the main contributing factor, then the stable rupiah will likely to be a very temporary phenomenon, and that the currency will continue to be

[12] These investment numbers were sourced from the Board of Investment Database.

fragile and likely to experience more rounds of attacks together with the returns of more substantial investment commitments in the future.

It is important to stress out again the adverse implication of political uncertainties on the volatility of the local currency. The rise in market pressures against the rupiah during the past few years have arguably been associated with the instability in the leadership of the Indonesian government. It remains to be seen whether the political climate will significantly improve in the near future under the leadership of Susilo Bambang Yudhoyono, the first directly elected President of the country.

In short, having more conclusive understandings on the natures of the attacks should help the government of Indonesia at the very least in selecting more effective policy responses to deal with the high market pressures. For the monetary authority in particular, the inability to detect the presence of high market pressures against the rupiah and to understand the root-causes of the attacks will unquestionably undermine the capacity to pursue its key policy objective of managing price stability and thus to achieve the targeted inflation rate.

Reference:

Alamsyah, H., Joseph, C., Agung, J., and Zulvredy, D. (2001), "Framework for Implementing Inflation Trageting in Indonesia", Bulletin of Indonesian Economic Studies, Vol. 37, No. 3, (December), pp. 309-324.

Bank of Indonesia. 2000-2003, Annual Reports.

Calvo, G.A., and Reinhart, C.M. (2002), "Fear of Floating", Quarterly Journal of Economics, 117 (2), pp. 379-408.

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

Djiwandono, S. (2000), "Policy Responses Facing Financial Crisis", mimeo.

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., 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 D. Roper, (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.

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

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

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

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, and de Vries, C.G. (1992), "Differences between foreign exchange rate regimes: the view from the tails," Journal of International Money and Finance, 11: 462-73.

Krugman, P. (1979), “A Model of Balance of Payment Crises”, Journal of Money, Credit and Banking, vol.11, pp. 311-325.

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

Obstfeld, M. (1996), “Models of Currency with Self-Fulfilling Features”, European Economic Review, vol. 40, pp.1037-1047.

Pontines and Siregar (2005),“Evaluating Exchange Rate Regimes of a Selected East Asian Economies During the Post-1997 Financial Crisis”, mimeo, School of Economics, University of Adelaide.

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

Sachs, J., A. Tornell, and A. Velasco (1996), “Financial Crises in Emerging Markets: The Lessons from 1995”, Brookings Papers on Economic Activity, Vol.1, pp.147-215.

Siregar, R. (1999), “Real Exchange Rate Targeting and Inflation in Indonesia: Theory and Empirical Evidence”, Applied Financial Economics, Vol. 9, No. 4, August 1999, pp.329-336.

Siregar, R., and Rajan, R. (2004), “Impacts of Exchange Rate Volatility on Indonesia’s Trade Performance in the 1990s”, Journal of the Japanese and International Economies, Vol. 18, pp. 218-240.

Williamson, J. (2004), “The Years of Emerging Market Crises: A Review of Feldstein”, Journal of Economic Literature, Vol. XLII (September), pp. 822-837.

Appendix: Extreme Value Theory[13]

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

$$M_n = \max(X_1, X_2, \ldots, X_n) \qquad \text{(A.1)}$$

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

$$P(M_n \leq x) = F^n(x) \qquad \text{(A.2)}$$

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:

$$P(M_n - b_n \leq a_n x) \xrightarrow{d} G(x) \qquad \text{(A.3)}$$

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

$$G(x) = \exp(-x^{-\alpha}) \qquad \alpha > 0 \qquad \text{(A.4)}$$

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,

---

[13] This section draws heavily from de Vries (1994), Koedijk and Kool (1992), Koedijk, Stork, and de Vries (1992); Huisman, Koedijk, Kool and Palm (2001).

$$\lim_{t\to\infty}\frac{1-F(tx)}{1-F(t)} = x^{-\alpha} \qquad \alpha > 0 \qquad \text{(A.5)}$$

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

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

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

$$= \int_t^\infty (\log x - \log t) f(x)\;dx \qquad \text{(A.6)}$$

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

$$\frac{\int_t^\infty (\log x - \log t) f(x)dx}{1-F(t)} = \int_1^\infty \frac{1-F(tu)}{1-F(t)}\frac{du}{u} \to \int_1^\infty u^{-\alpha}\frac{du}{u} = \frac{1}{\alpha} \qquad \text{(A.7)}$$

Let $X_{(n)} \geq X_{(n-1)} \geq \ldots \geq X_{(1)}$ 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 $t = X_{(n-k)}$ and hence:

$$\hat{\gamma} = \frac{1}{k}\sum_{i=0}^{k-1} \frac{\log X_{(n-i)}}{X_{(n-m)}} \qquad \text{(A.8)}$$

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.

Table 1: Bank Indonesia Intervention Spread

Date of Change	Before (Rupiah)	Percent	After (Rupiah)	Percent
16 Sep 1992	6	0.25	10	0.50
3 Jan 1994	10	0.5	20	1.00
5 Sep 1994	20	1.00	30	1.50
30 June 1995	30	1.50	44	2.00
29 Dec 1995	44	2.00	66	3.00
13 June 1996	66	3.00	118	5.00
11 Sep 1996	118	5.00	192	8.00
11 July 1997	192	8.00	304	12.00

Source: Djiwandono (2000)

Table 2: The Conventional Method

$(\mu + 1.5\sigma)$, where: μ is the mean and σ is the standard deviation

	3-month exclusion window		**6-month exclusion window**	
n = # of Samples	**# of Episodes**	**Incidence (%)**	**# of Episodes**	**Incidence (%)**
225	5	22	4	1.8

Table 3: Basic Descriptive Statistics

	Mean	Standard Deviation	Skewness	Kurtosis	Jarque-Bera Statistic
EMP Index	-1.00	9.71	1.17	27.10	5448.91*

Note: *****The null hypothesis of a normally distributed EMP measure is rejected.

Table 4: Unit Root Tests

	ADF test[a] without trend	ADF test[a] with trend	DF-GLS[a] without trend	DF-GLS[a] with trend	KPSS test[b] without trend	KPSS test[b] with trend
EMP Index	-14.791***	-14.778***	-2.611***	-13.947***	0.075	0.044

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

[a] The ADF/DF-GLS 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 5: Ljung-Box Q-statistic

Variable	Q-Statistics
EMP Index	16.2

Notes: the Ljung-Box Q-statistic tests the null hypothesis of no autocorrelation at the relevant lag.

Table 6: HKKP-Extreme Value Theory

		3-Month Window		6-Month Window	
n = # of sample	k	**# of Episodes**	**Incidence (%)**	**# of Episodes**	**Incidence (%)**
223	26	16	7.2	13	5.8

Table 7: Crisis Episodes Using Conventional and EVT Methods with Corresponding Chronologies of Political and Economic Events/Factors

Extreme Value Theory (EVT)	Chronology of economic and political events
Feb., Sept. 1985	Accelerated slump in world oil prices
Nov. 1986	Worsening trade balance and increase in external debt due to drastic drop in world oil prices
June 1987	Capital flight precipitates monetary crisis, and first *Gebrakan Sumarlin* results in interbank rates of up to 45 per cent; foreign investment regulations liberalised
July 1988	Major financial sector reforms enacted—entry provisions liberalised, reserve requirements reduced, and a withholding tax on bank deposits imposed
June 1989	Rumours that government would let the rupiah to float; limit set on the rupiah's depreciation
April 1990	A further trade reform package; Bank Duta, one of the largest private banks, announces foreign exchange losses of $420 million
April 1994	Another scandal rocks the financial system, the Bapindo scandal; slowdown in the growth of non-oil/gas exports; eruption of labour unrest
Sept. 1995	Fallout from the Mexican peso crisis
Aug. 1997	Contagion effect from the depreciation of the Thai baht hits
April 1998	Signs new IMF letter of intent; President Suharto steps down and Vice President Habibie takes over, amidst violent protests; plans to implement currency board system; IMF threatens to cut funding if currency board system implemented
Feb., Nov. 2001	Dismissal of Abdurrahman Wahid and sworning in of Megawati Sukarnoputri as President; continuing political uncertainty and serious security concerns

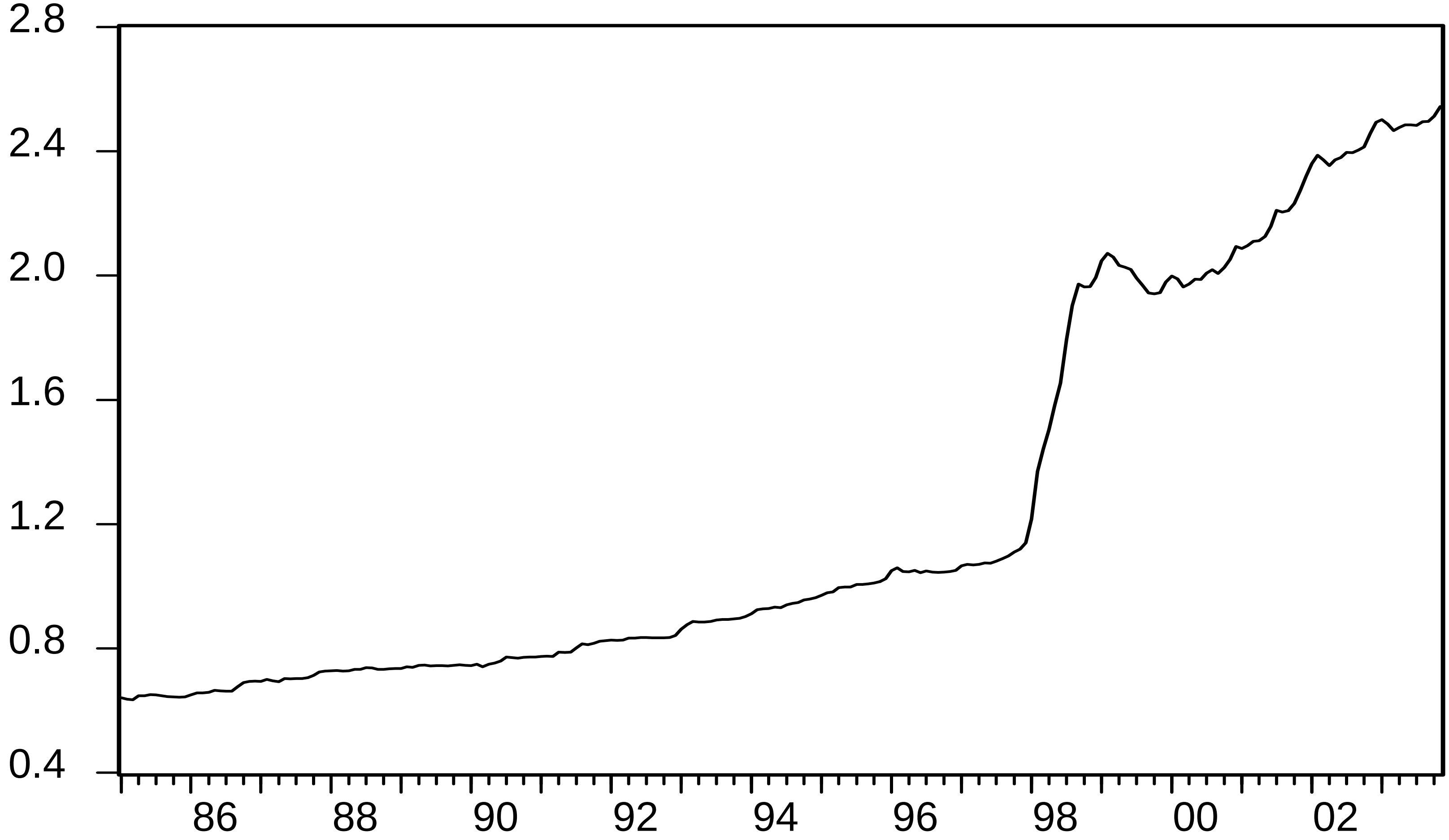
Table 8:
Crisis Episodes Ranked According to Size/Severity
Using Conventional Method and Extreme Value Theory (EVT)

Conventional Method	Size of Computed EMP	Extreme Value Theory	Size of Computed EMP
August 1997	37.81[a]	August 1997	37.81[a]
December 1986	20.98	November 1986	13.08[b]
February 2001	14.59	February 2001	14.59
		April 1998	12.82[c]
		April 1994	11.71
		June 1987	10.64
July 1988	8.09	July 1988	8.09
		April 1990	7.81
		June 1989	7.34
		September 1985	5.79
		February 1985	5.62
		September 1995	5.21
		November 2001	5.01

Notes:
The crisis dates were based on a 6-month exclusion window and using 1.5 standard deviations above the mean for the conventional method.
[a, c] Computed as the six-month average of the estimated EMPs beginning with the indicated crisis date.
[b] average of November and December 1986.

Source: Author's own calculation.

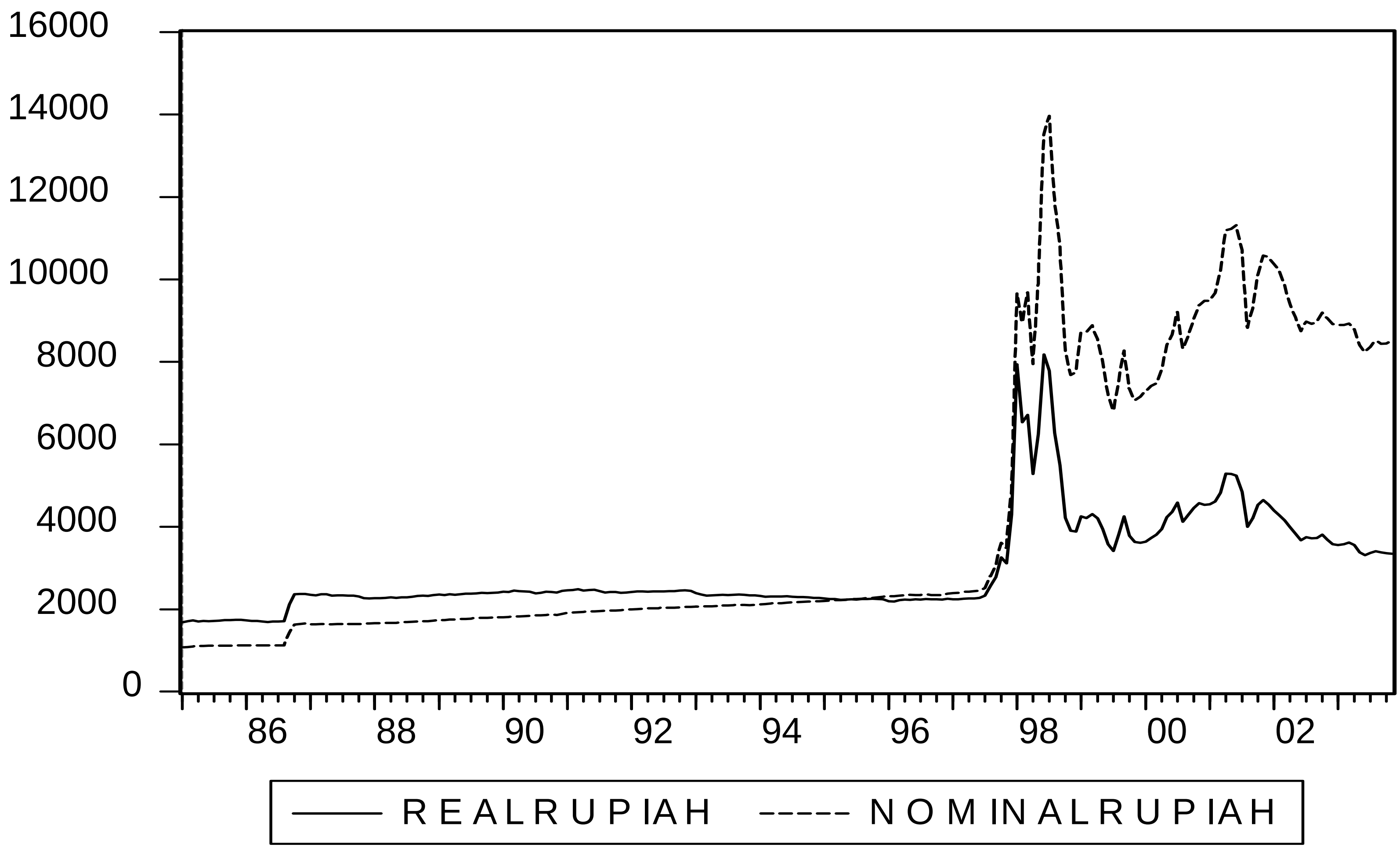
Figure 1: Ratio of Indonesian CPI over US CPI
Quarter 1, 1985 – Quarter 4, 2003



Source: Authors' own calculation.

Figure 2: Nominal and Real Rupiah Exchange Rate (Rp = 1US$)

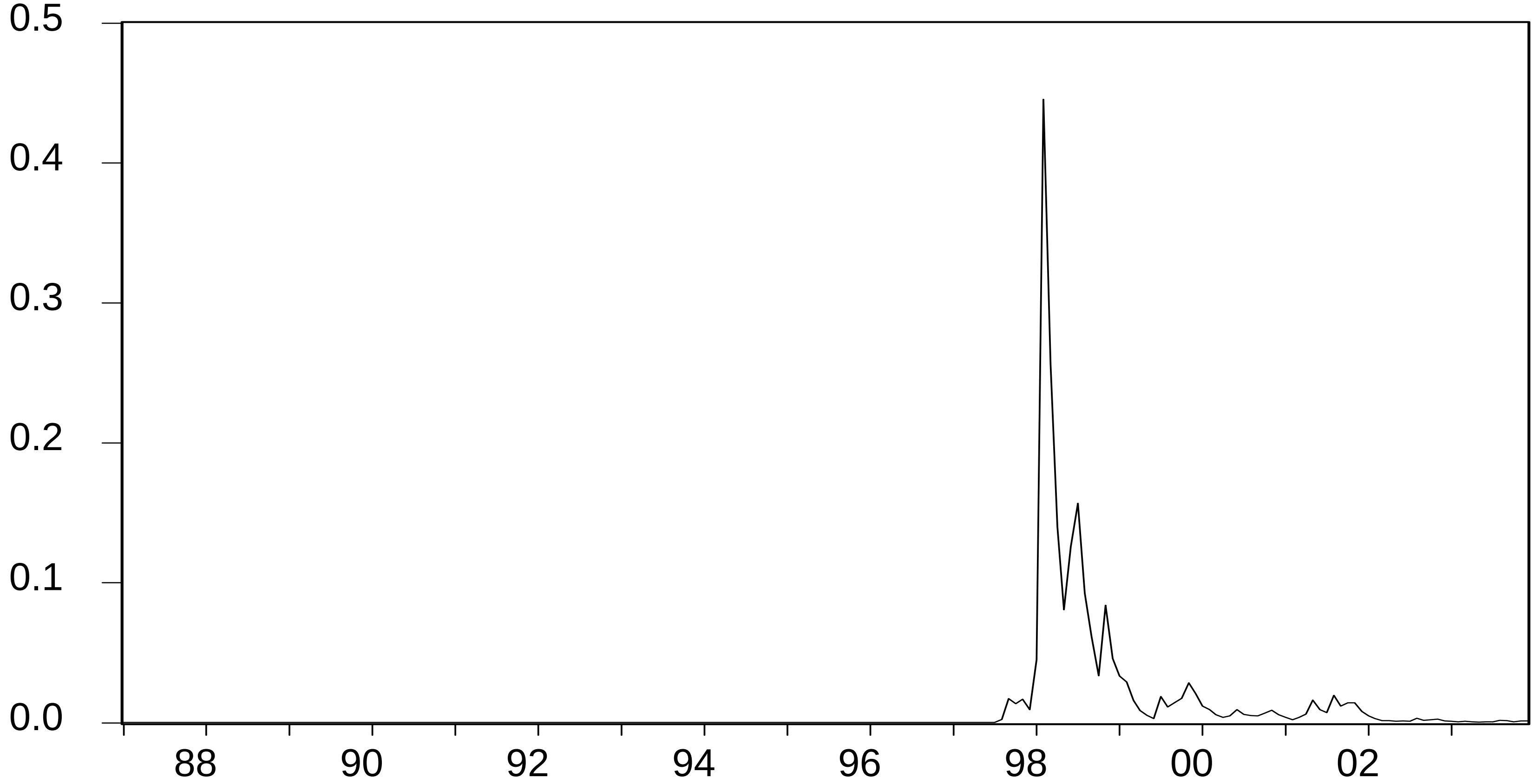
Quarter 1, 1985 – Quarter 4, 2003



Source: IFS-CD ROM and Authors' own calculation.

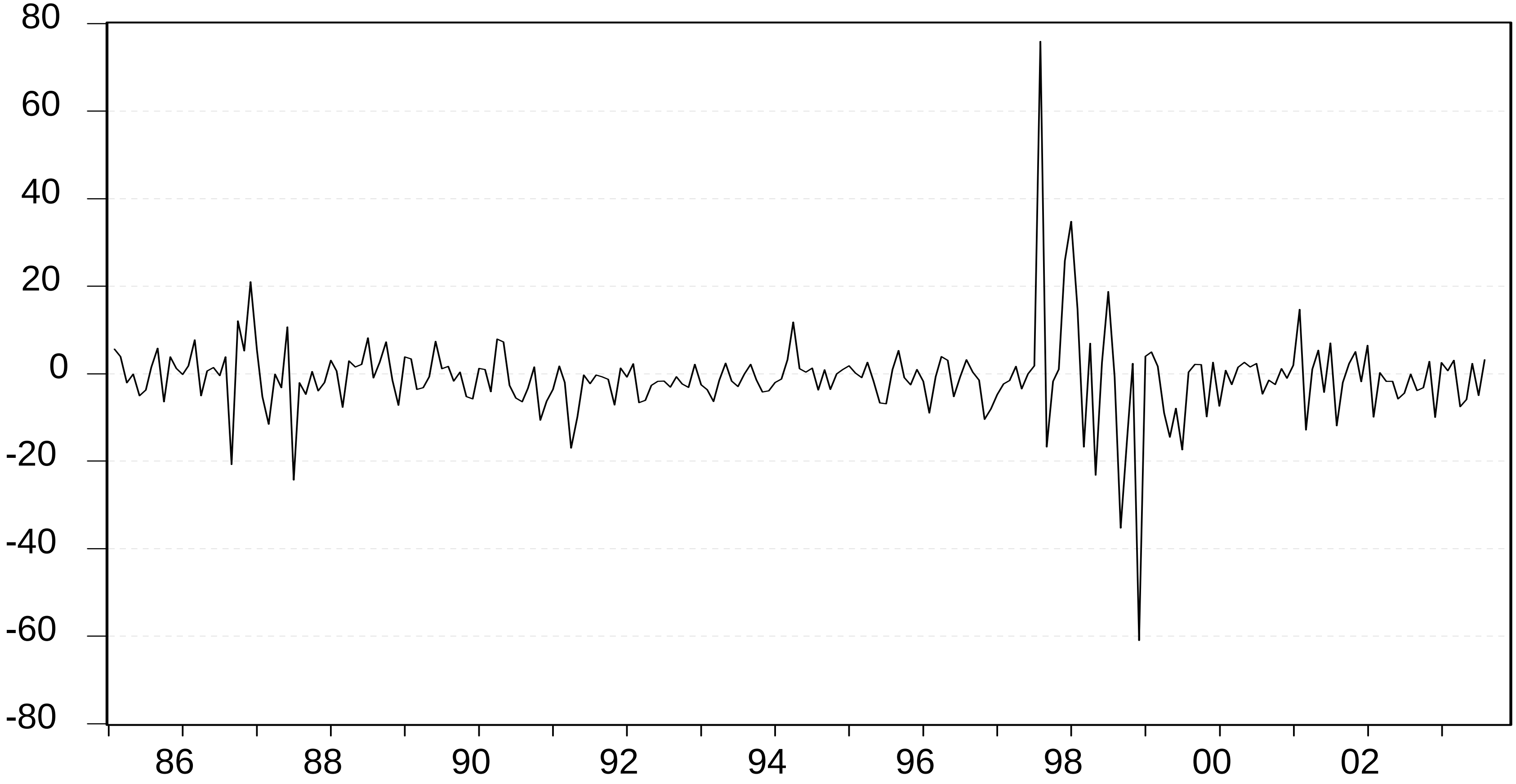
Figure 3: GARCH (1,1) of Rupiah

January 1987 – December 2003



Source: Authors' own calculation.

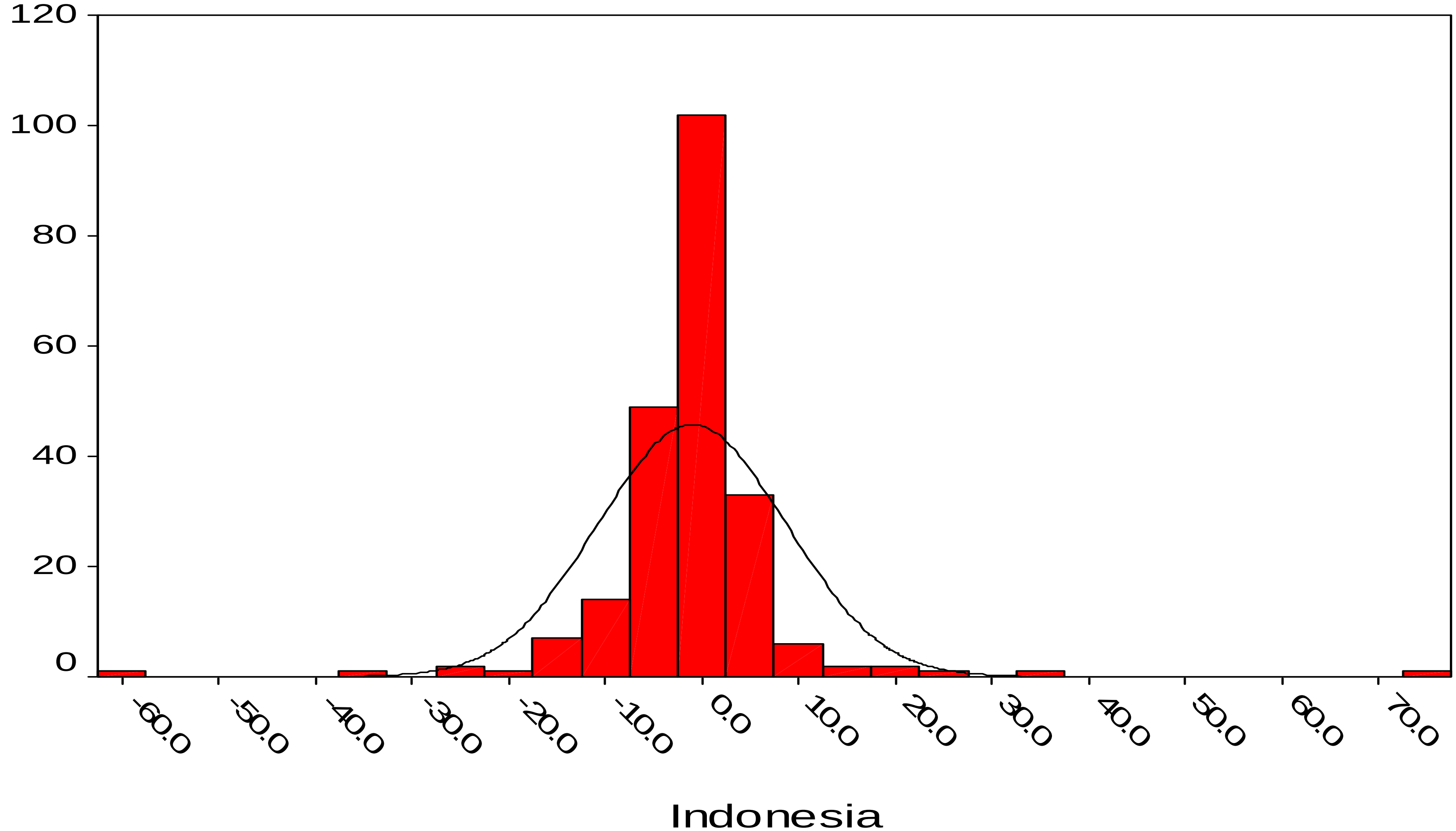
Figure 4: KLR-EMP of the Rupiah Real Exchange Rate



Source: Authors' own calculation.

Figure 5:

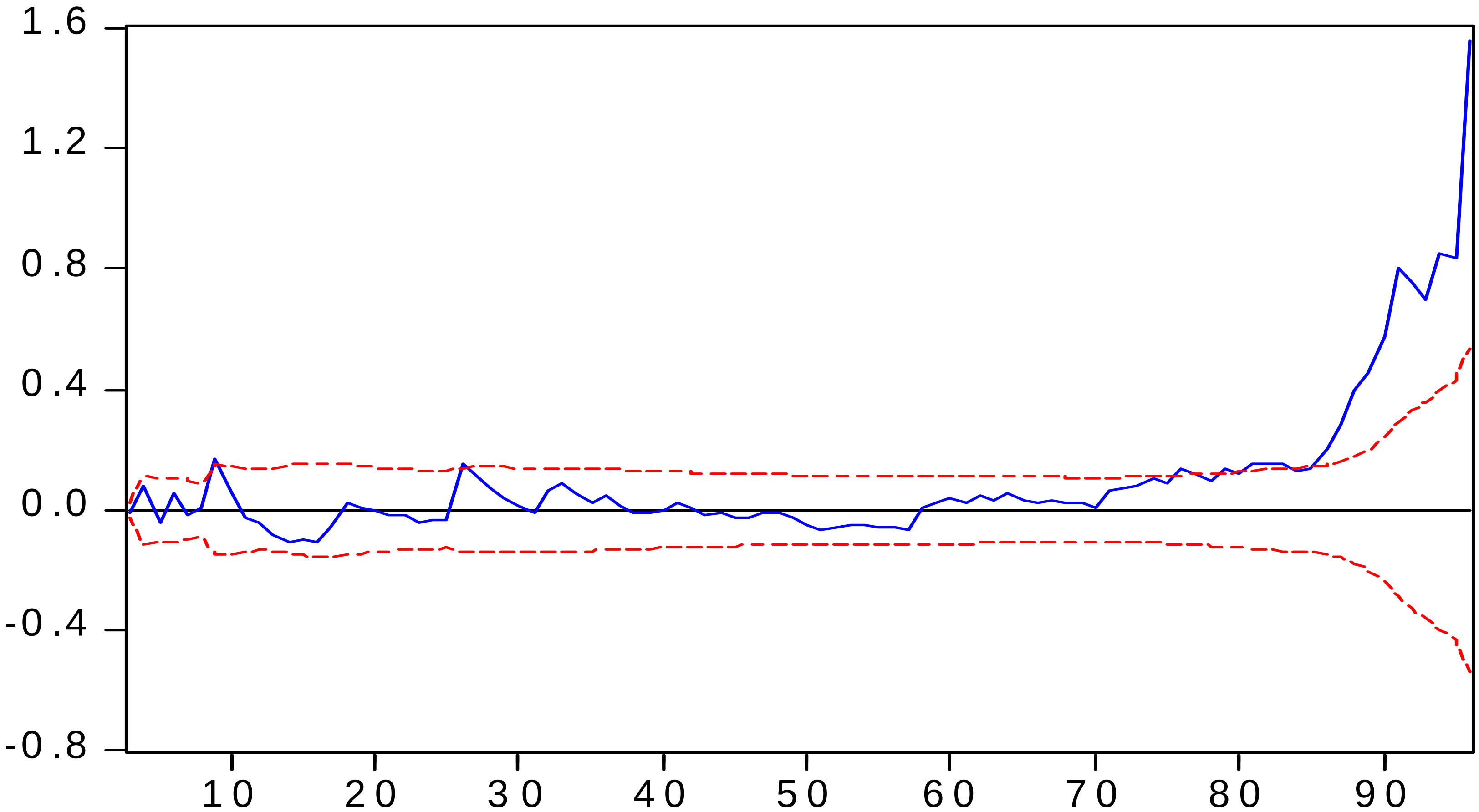
Histogram of KLR – EMP Measure of Indonesia and Corresponding Probability Density Functions



Source: Author’s own calculation.

Figure 6:

Recursive Residual Using KLR-EMP Measure for Indonesia



Source: Author's own calculation.

CIES DISCUSSION PAPER SERIES

The CIES Discussion Paper series provides a means of circulating promptly papers of interest to the research and policy communities and written by staff and visitors associated with the Centre for International Economic Studies (CIES) at the Adelaide University. Its purpose is to stimulate discussion of issues of contemporary policy relevance among non-economists as well as economists. To that end the papers are non-technical in nature and more widely accessible than papers published in specialist academic journals and books. (Prior to April 1999 this was called the CIES Policy Discussion Paper series. Since then the former CIES Seminar Paper series has been merged with this series.)

Copies of CIES Policy Discussion Papers may be downloaded from our Web site at http://www.adelaide.edu.au/cies/ or are available by contacting the Executive Assistant, CIES, School of Economics, Adelaide University, SA 5005 AUSTRALIA. Tel: (+61 8) 8303 5672, Fax: (+61 8) 8223 1460, Email: cies@adelaide.edu.au. Single copies are free on request; the cost to institutions is US$5.00 overseas or A$5.50 (incl. GST) in Australia each including postage and handling.

For a full list of CIES publications, visit our Web site at http://www.adelaide.edu.au/cies/ or write, email or fax to the above address for our *List of Publications by CIES Researchers, 1989 to 1999* plus updates.

0504 Siregar, Reza Y. and Pontines, Victor, "Incidences of Speculative Attacks on Rupiah During The Pre- and Post-1997 Financial Crisis", May 2005
0503 Cavoli, Tony and Rajan, Ramkishen S., "Have Exchange Rate Regimes in Asia Become More Flexible Post Crisis? Re-visiting the evidence." January 2005
0502 Cavoli, Tony, "Sterilisation, Capital Mobility and Interest Rate Determination for East Asia" February 2005
0501 Marrewijk, Charles Van, "Basic Exchange Rate Theories" February 2005
0415 Griffiths, William and Webster, Elizabeth. "The Determinants of Research and Development and Intellectual Property Usage among Australian Companies, 1989 to 2002" December 2004
0414 Marrewijk, Charles Van and Koen G. Berden, "On the static and dynamic costs of trade restrictions" November2004
0413 Anderson, Kym , Lee Ann Jackson and Chantal Pohl Nielsen "Genetically Modified Rice Adoption" November 2004
0412 Anderson, Kym , "The Challenge of Reducing Subsidies and Trade Barriers" November 2004
0411 Anderson, Kym and Lee Ann Jackson, "Standards, Trade and Protection: the case of GMOs", November 2004
0410 Anderson, Kym, Richard Damania and Lee Ann Jackson, "Trade, Standards, and the Political Economy of Genetically Modified Food", November 2004
0409 Anderson, Kym and Lee Ann Jackson, "Some Implications of GM Food Technology Policies for Sub-Saharan Africa", November 2004
0408 Anderson, Kym and Lee Ann Jackson, "GM Food Crop Technology and Trade Measures: Some economic Implications for Australia and New Zealand" November 2004
0407 Marrewijk, Charles Van, "An Introduction to International Money and Foreign Exchange Markets", October 2004
0406 Pontines, Victor and Reza Y. Siregar, "The Yen, The US dollar and The Speculative Attacks Against The Thailand Baht", October 2004

0405 Siregar, Reza and William E. James, “Designing an Integrated Financial Supervision Agency: Selected Lessons and Challenges for Indonesia”, October 2004

0404 Pontines, Victor and Reza Y. Siregar, “Successful and Unsuccessful Attacks:Evaluating the Stability of the East Asian Currencies”, August 2004

0403 Siregar, Reza and Ramkishen S. Rajan “Exchange Rate Policy and Reserve Management in Indonesia in the Context of East Asian Monetary Regionalism “, August 2004

0402 Siregar, Reza “Interest Spreads and Mandatory Credit Allocations: Implications on Bank Loans to Small Businesses in Indonesia”, January 2004.

0401 Cavoli, Tony., Ramkishen S. Rajan, and Reza Siregar “A Survey of Financial Integration in East Asia: How Far? How Much Further to Go?”, January 2004.

0323 Rajan, Ramkishen., Reza Siregar and, Graham Bird “Examining the Case for Reserve Pooling in East Asia: Empirical Analysis”, September 2003.

0322 Chantal Pohl Nielsen and Kym Anderson “Golden Rice and the Looming GMO Trade Debate: Implication for the Poor”, July 2003.

0321 Anderson, Kym “How Can Agricultural Trade Reform Reduce Poverty?” July 2003.

0320 Damania, Richard and Erwin Bulte “Resources for Sale: Corruption, Democracy and the Natural Resource Curse”, July 2003.

0319 Anderson, Kym “Agriculture and Agricultural Policies in China and India Post-Uruguay Round”, July 2003.

0318 Bentick, Brian L. and Mervyn K Lewis, “Real Estate Speculation as a Source of Banking and Currency Instability: Lessons from the Asian Crisis”, July 2003.

0317 Barreto, Raul A. and Kaori Kobayashi, “Open Economy Schumpeterian Growth”, May 2003

0316 Barreto, Raul A. and Kaori Kobayashi, “Economic Integration and Endogenous Growth Revisited: Pro-competitive Gains from Trade in Goods and the Long Run Benefits to the Exchange of Ideas”, May 2003.

0315 Wilson, Patrick J. and Ralf Zurbruegg, “Trends and Spectral Response: An Examination of the US Realty Market”, May 2003.

0314 Esho, Neil and Anatoly Kirievsky, Damian Ward and Ralf Zurbruegg, “Law and the Demand for Property-Casualty Insurance Consumption”, May 2003. Since published in *Journal of Risk and Insurance*, June 2004 v71 i2 p265(19)

0313 Wilson, Patrick J. and Ralf Zurbruegg, “Does it Pay to Diversify Real Estate Assets? - A Literary Perspective”, May 2003.

0312 Rajan, Ramkishen, “Taxing International Currency Flows: A Financial Safeguard or Financial Bonanza?”, April 2003.

0311 Rajan, Ramkishen, “Financial Crisis, Capital Outflows and Policy Responses: Simple Analytics and Examples from East Asia”, April 2003.

0310 Cavoli, Tony and Ramkishen Rajan, “Exchange Rate Arrangements for East Asia Post-Crisis: Examining the Case for Open Economy Inflation Targeting”, April 2003.

0309 Cavoli, Tony and Ramkishen Rajan, “Designing Appropriate Exchange Rate Regimes for East Asia: Inflation Targeting and Monetary Policy Rules”, April 2003.

0308 Allsopp, Louise, “Speculative Behaviour, Debt Default and Contagion: An Explanation of the Latin American Crisis 2001-2002”, March 2003.

0307 Barreto, Raul. A., A Model of State Infrastructure with Decentralized Public Agents: Theory and Evidence, March 2003.

0306 Pardey, Philip G., Julian M. Alston, Connie Chan-Kang, Eduardo C. Magalhães, and Stephen A. Vosti, “Assessing and Attributing the Benefits from Varietal Improvement Research: Evidence from Embrapa, Brazil”, March 2003.

0305 Allsopp, Louise, “Venezuela: A Nation In Need of Reform”, March 2003.