ABSTRACT

The financial crises that have happened during the past few years give us an opportunity to think in retrospect about crisis. The objective of this paper is to identify and analyse various indicators which were affected by the East Asia crisis. The methodology employed is more scientific and systematic and studies structural breaks, before, during and after the crisis. Dummy variables have been used for both A5 countries and India which enabled inter-temporal and international comparisons of crisis variables. The variables do not show the same trend in case of all the crisis-hit countries. In India, none of the variables show structural break indicating that India was not hit by the crisis.

Key Words: Currency Crisis, Macro indicators of crisis, financial indicators of crisis, Structural breaks

1.0 Introduction

The occurrence of crisis, of whatever nature, always stimulates a deep interest in the study of the relevant causes, consequences, and possible cures for such episodes. In the wake of these events, one important question has been the need and the feasibility of predicting such crisis. For this it is essential to analyze the crisis empirically. The objective of this paper is to focus on this last issue. The occurrence of crisis reflects structural and policy distortions in the countries. Fundamental imbalances triggered the currency and financial crisis in 1997.

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Much of the debate about the origin of the Asian crisis concerns whether it was caused by weak economic fundamentals, or by financial panic unrelated to economic conditions. While the two views are not mutually exclusive, their policy implications vary greatly. This paper attempts to give a retrospective on the Asian currency crisis with a view to arrive at a methodology for studying currency crisis in terms of structural break and derive lessons for other countries.

We use different indicators of crisis, classify them as macro and financial variables and then analyse these crisis variables systematically through studying structural breaks. Another part of our analysis relates to India as a benchmark country where it was expected that there would be no structural breaks since it was relatively unaffected by crisis.

This paper is laid out in the following sections. Section two discusses the literature review; section three lays down the methodology; section four explains the variables of interest; section five analyses and discusses the results; and section six gives conclusions.

2.0 Literature Review

The abundance of theoretical models has failed to generate the same variety of empirical models. Most of the previous empirical research has used indicators capturing fiscal and monetary imbalances, economic slowdown, and the over-borrowing syndrome to predict crises. Radelet and Sachs (1998) argue that the reversal in net capital flows, exchange rates and sovereign ratings in a short period cannot be attributed to changes in the affected countries’ fundamentals. Current account deficits, overvalued exchange rates (in real terms), overinvestment in real estate and declining capital productivity all figure prominently in the list of culprits of Asia’s crisis (see, e.g. Corsetti et al., 1998). The attempts of investors to anticipate the inevitable collapse would generate a speculative attack on the currency when reserves fall to some critical level (Krugman, 1979). Sachs, Tornell and Velasco (1996) identify real exchange rates, bank loan growth (as an indicator of bank fragility) and the ratio of country M2 to reserves (indicating reserve adequacy) as significant crisis predictors. In fact, a purely macroeconomic analysis failed to identify Asia’s vulnerabilities as there was fiscal restraint to deal with appreciation pressures,
considerable sterilization of inflows and/or reserve requirements on foreign currency deposits, no signs of CPI-adjusted real currency overvaluation, higher investment rates (rather than consumption) resulting from net inflows and a variety of capital inflow controls in the Asian crisis countries (Reisen, 1996). Increases in interest rates, and related declines in asset values that were heavily used as collateral for domestic lending, would have promoted a banking and financial crisis. As higher interest rates tend to intensify adverse selection problems in developing countries (Mishkin, 1996), they lead to a steep decline in domestic lending, investment and aggregate activity. There are, of course, several reasons why interest rate spreads or changes in sovereign credit ratings may not anticipate financial crises well. One reason could be that market participants may not have timely, accurate and comprehensive information on the borrower’s creditworthiness (Goldstein 1998a; Corsetti, Pesenti and Roubini 1998).  

There is evidence that the onset of a banking crisis typically precedes a currency crash (Kaminsky and Reinhart, 1996). Some studies find that a currency crisis elsewhere in the world increases the probability of a speculative attack by an economically and statistically significant amount even after controlling for economic and political fundamentals in the country concerned (Eichengreen, Rose and Wyplosz, 1996; Kaminsky and Reinhart, 2000). Different studies have identified different reasons for the Asian currency crisis ranging from credit boom experienced by the four ASEAN economies (Thailand, Indonesia, Malaysia, and Philippines); concentration of credit in real estate and equities; easy global liquidity conditions; capital account liberalization coupled with weak financial sector supervision; large current account deficits and real exchange rate overvaluations in the run up of the crises; increasing competition from China; and global overproduction in certain industries important to the crisis countries (Corsetti, Pesenti and Roubini 1998; Goldstein 1998; Radelet and Sachs 1998).  

Kaminsky, Lizondo and Reinhart (1997) find that the best indicators are apparently the real exchange rate, domestic credit, credit to public sector and inflation. The trade balance, export performance, increase in money supply and gross domestic product and public deficit may also provide early warning of crisis. The period considered in these studies did not, however, include the period of the Asian crisis.
3.0 Methodology

The paper aims to analyse the Asian currency crisis which itself is a complex web of threads. Both macro and financial variables have contributed towards the crisis (Sebastian 1999). In order to measure the crisis, the prerequisite measure is to analyse the currency crisis empirically [Edison (2000), Goldstein (2000) and Kaminsky (1997)]. The literature on currency crises highlights the various kinds of financial and macro variables which support the currency crises (Corsetti 1998).

Most of the extant studies have not been able to identify a set of variables that could, in general, represent crisis. Even when literature does identify such variables the basis is somewhat ad hoc because either the variables are directly borrowed from the existing theoretical literature or they are randomly used in specifying models of estimation. A related question is as to whether all crisis ridden countries have had the same experience with respect to the crisis variables. Finally, it is not only important to study the impact of crisis on these variables in relation to their past trend (during the pre-crisis period) but also to study the variables in relation to an absolute benchmark that is neutral (non-crisis country). Without such a comparison it would not be known whether the indicator can at all be treated as a crisis variable (Malik 2008).

To overcome the above limitations and analyse currency crisis empirically, we adopted the following procedure:

1. Listing the variables which are significant and are supported by literature.
2. Testing for correlation among all the variables that are financial and macro variables.
3. Testing if there is any structural break in the variables in the three policy periods namely pre-crisis period, crisis period and post-crisis period, in case of crisis-hit countries. This is done with the help of a dummy variable exercise.
4. Testing whether a neutral country like India was affected by crisis by means of testing for structural breaks.

To analyse the currency crisis, five Asian countries, Malaysia, Indonesia, Philippines, South Korea and Thailand were selected. These countries have been selected because the Asian flu hit Thailand and spread to other countries in the
region, except Singapore, almost instantaneously. India is also included as a country and it acts as a control in our analysis as it was not hit by the crisis.

**Data set: Sources and frequency**

The data for the above mentioned variables were taken from the World Development Report and World Development Indicators (World Bank) 2004. The data is taken from 1987 to 2002. We have used annual data to analyse the crisis because our interest was not in analysing the process of the crisis but in modeling the structural break in the three policy periods mentioned above. Although the actual crisis began in the period 1997-98, the year 1987 was a relevant threshold period for South East Asian countries because their process of economic liberalization preceded South Asian countries like India (although it is not possible to arrive at a uniform cut off year for all these economics).

In the case of India there was a pre reform period from mid-eighties to late-eighties during which some of the early measures of liberalization had been undertaken. As regards the conduct of monetary policy, the choice of targets, instruments and operating procedures was circumscribed to a large extent by the nature of the financial markets and the institutional arrangements. In this context, the period prior to 1992 can be termed as the pre-reform period, with the post-reform period emerging thereafter. Although the reform of the financial sector was initiated in the mid-1980s, the process was hastened following the economic crisis in the summer of 1991. The foundation for the reform of the monetary and financial system was laid by the Committee to Review the Working of the Monetary System (Chakravarty Committee, 1985) and the Working Group on the Money Market (Vaghul Group, 1987).

The financial sector reforms initiated following the recommendations of the Narasimham Committee (1991), in conjunction with the recommendations of the Chakravarty Committee and the Vaghul Working Group, produced far-reaching changes in the financial sector which had an important bearing on the conduct of monetary policy. This justifies the period of 1987 in case of India also, although the actual liberalization took place in the year 1991.
Normalization of data

All the macro and financial variables as given in Table 1 are in relative terms except the variables VAR 1M and VAR 10M, that is, Changes in Net Reserves (BOP, Current US $) and Official Exchange Rate (LCU per US $, period average). In order to bring these two variables in line with other variables, Changes in Net Reserves (BOP, current US $) was transformed as Changes in Net Reserves as a percent of GDP current LCU by dividing the variable with GDP current LCU. GDP is used because it is a basic indicator of the size of the economy. Similarly Official Exchange Rate (LCU per US $, period average) was transformed as a percent change from the previous year. After doing this, the data set got reduced from 1987-2002 to 1988-2002.

Similarly in case of financial variables VAR 9F, VAR 11F, VAR 16F are not in percentage terms, such as, VAR 9F - Long Term Debt (DOD, current US $), VAR 11F - Portfolio Investment Equity (DRS, current US $) and VAR 16F - Total Reserves (includes Gold Current US $) and were transformed as a percent of GDP Current LCU, by dividing the variable with, GDP current LCU. Where any data points were missing they were calculated with the help of interpolation and extrapolation and not by using simple average. This is done in case of four variables not exceeding two missing data points.

Crisis window

For our analysis crisis window is taken as 1997-98. The literature review also supports that the Asian crisis occurred in 1997 and the impact of the same was felt in the next year as well. Therefore, neither 1997 nor 1998 can be ignored. An important assumption in our paper is that the crisis is not a long term phenomenon. Hence, it is unlikely to be captured by theory of co integration which essentially is meant for the long term phenomena. It is a medium term phenomenon with short term effect that wear-off after the crisis during recovery. It is essentially a policy matter and occurs during a transitional phase of economic growth. We are also not treating crisis as a short term phenomenon like some of the extant studies which use weekly or monthly data to predict the exact turn of events during a crisis.
Testing for structural break

Dummy variables are very useful for capturing a variety of qualitative effects. They typically have the value “0” or “1” and so possibly a better name is “binary variable”. They can be included as explanatory variables in the regression equation and the estimated coefficients and standard errors can be used in hypothesis testing. Dummy variables do not have a natural scale of measurement. That is why they are described as nominal variables.

The purpose of studying the variables is to know whether the trend of these variables is affected by crisis or not. We wish to know whether there is any significant change in the trends of the variable during the crisis as well as in the post-crisis period in comparison to pre-crisis period. We wish to interpret the change, if any in terms of the expected direction of change, and test whether it is significant, or not. For this purpose we have introduced two types of dummies. The category to which no dummy is assigned is known as the base or benchmark category, and all comparisons are made in relation to the benchmark category. Two dummies have been included to measure the three crisis periods (pre-crisis, crisis and post-crisis period). No dummy has been included for the pre-crisis period.

The first is a set of intercept dummy, that tell the change in the intercept, at the threshold of each policy period, in comparison to the initial value of the intercept. The other dummy is a slope dummy, which tells us about the change in the slope coefficient during the two policy periods, crisis and post-crisis, in comparison to the trend, during the pre-crisis period. Both dummies have been constructed in difference form. In the case of differences dummies the coefficients attached to the dummy variable in the equation are known as the differential intercept coefficients because they tell by how much the value of the intercept, which bear the value of one, differ from the intercept coefficient of the benchmark category.

Such an analysis would tell us about structural breaks in the trend of the relevant variables. Unless there are significant changes in the intercept and/or the slope of the trend we cannot conclude that there was a structural break. Only those variables from amongst the list of thirty variables will be considered to be crisis variables or indicators of crisis which display such structural break.
The dummy variable exercise is done with the help of following set of i*j equation:

\[ \text{VAR}_{it} = a + b_i * D1 + b2 * D2 + b3 * T + b4 * D1*T + b5 * D2*T + e_t \]

\[ \text{VAR}_{it} = \text{Financial and Macro Variables.} \]

- a = Intercept
- D1 = Crisis Period (intercept dummy)
- D2 = Post Crisis period (intercept dummy)
- T = Time/ Year
- D1*T = Trend in crisis period (slope dummy)
- D2*T = Trend in the post crisis period (slope dummy)
- b1 = Difference in intercept between crisis period and pre crisis period
- b2 = Difference in intercept between post crisis period and pre crisis period
- b3 = Slope of the time.
- b4 = Difference in slope between crisis period and pre crisis period
- b5 = Difference in slope between post crisis period and pre crisis period.
- e = Error term for i countries for j variables and at t time period

D1 = 1988-96=0, 1997-98=1, 1999-2002=0.
D2 = 1988-98=0, 1999-2002=1.

The coefficient of dummy D1 measures the structural break, if any in the variable during the crisis period in comparison to pre-crisis period. Similarly the coefficient of dummy D2 measures the structural break in the variable, in the post crisis period in comparison to pre-crisis period.

If the coefficients of the intercept dummies are statistically significant they represent a structural break in the relevant period, for instance a statistically significant coefficient of D1 would show that there is a structural break during the crisis in comparison to the pre-crisis period. The magnitude of the change would be measured by the value of the coefficient and the direction of the change would be measured by the sign of the coefficient. Negative coefficient would indicate a fall in the intercept and a positive one would indicate a rise.

The slope dummies were represented as D1T and D2T respectively. The coefficient of slope dummy D1T measures the structural break, if any in the trend of the variable during the crisis period in comparison to pre-crisis period. Similarly the coefficient of slope dummy D2T measures the structural break, if
any in the trend of the variable in the post crisis period in comparison to pre-crisis period.

Similarly slope coefficient would represent a structural break in the trend of the variable during the period. For instance if the coefficient of $D_{1}T$ is statistically significant it would represent a rise in the trend of the variable during the crisis period. If the sign is negative and the coefficient is significant it would indicate a relative fall in the trend during crisis. However it is essential to know the overall intercept as well as slope in the relevant period. For instance if the coefficient of $D_{1}T$ is significant and the sign is negative such that the sum of coefficient of 'T' plus the coefficient of $D_{1}T$ is negative it indicates an absolute reversal of the trend. The intercept dummy affects the variable at a point of time whereas the slope dummy affects the variable over a period of time.

4.0 The Variables of Interest

Macroeconomic imbalances in the countries are assessed within a broad overview of macro factors and the financial sector reforms which were not supervised effectively where assessed with the help of financial variables. Initially there were ninety three variables which were taken from the World Bank CD Rom World Bank Year Book 2004. After analyzing all the ninety three variables some of the common variables were dropped. Some of the variables were retained while others which were very similar but measured in different terms and giving the similar kind of information were dropped. For instance where GDP was given as GDP (PPP US $) as well as GDP (US $) we have retained GDP (US $). By this process, the total number of variables was reduced from ninety three to fifty four.

In the second stage of data reduction these fifty four variables were reconciled with the extant literature or studies and a list of thirty variables were finally selected out of which fourteen were macro variables and sixteen were financial variables. The list of variables is shown in Table 1. We have not separated the variables into external, real and monetary because earlier models have already done that and we want to present our model from a different perspective.
Table 1: List of Macro and Financial Variables

| Code     | Abbreviation of the variable | Name of the variable                                                                 |
|----------|------------------------------|--------------------------------------------------------------------------------------|
| VAR1M*  | BN.RES.INCL.CD               | Changes in net reserves (as a % of GDP Current LCU)                                   |
| VAR2M    | BN.CAB.XOKA.GD.ZS            | Current account balance (% of GDP)                                                    |
| VAR3M    | NE.EXP.GNFS.ZS               | Exports of goods and services (% of GDP)                                             |
| VAR4M    | NY.GDP.MKTP.KD.ZG            | GDP growth (annual %)                                                                 |
| VAR5M    | NY.GDP.PCAP.KD.ZG            | GDP per capita growth (annual %)                                                      |
| VAR6M    | NE.GDI.TOTL.ZS               | Gross capital formation (% of GDP)                                                    |
| VAR7M    | NE.IMP.GNFS.ZS               | Imports of goods and services (% of GDP)                                              |
| VAR8M    | NV.IND.TOTL.ZS               | Industry, value added (% of GDP)                                                      |
| VAR9M    | FP.CPI.TOTL.ZG               | Inflation, consumer prices (annual %)                                                 |
| VAR10M* | PA.NUS.FCRF                  | Official exchange rate (LCU per US$, period average as a % change over previous year) |
| VAR11M   | GB.BAL.OVRL.GD.ZS            | Overall budget balance, including grants (% of GDP)                                   |
| VAR12M   | FM.LBL.QMNY.CN               | Quasi money (current LCU)                                                            |
| VAR13M   | FR.INR.RINR                  | Real interest rate (%)                                                                |
| VAR14M   | PX.REX.REER                  | Real effective exchange rate index (1995 = 100)                                      |
| VAR1F    | FR.INR.DPST                  | Deposit interest rate (%)                                                             |
| VAR2F    | FS.AST.PRVT.GD.ZS            | Domestic credit to private sector (% of GDP)                                          |
| VAR3F    | GB.FIN.DOMS.GD.ZS            | Domestic financing, total (% of GDP)                                                  |
| VAR4F    | BX.KLT.DINV.DT.GI.ZS         | Foreign direct investment, net inflows (% of gross capital formation)                  |
### Studying Crisis through Structural Breaks

These thirty variables are relevant variables covering the range of financial variables and macro variables selected on the basis of minimizing data redundancy and satisfying the criterion of relevance from the point of view of theory and past empirical findings (Goldstein (2000), Corsetti (1998) and Sebastian (1999)).

| VAR  | Description                                                                 |
|------|-----------------------------------------------------------------------------|
| VAR5F | BG.KAC.FNEI.GD.ZS | Gross private capital flows (% of GDP) |
| VAR6F | IQ.ICR.RISK.XQ | ICRG composite risk rating (0=highest risk to 100=lowest) |
| VAR7F | FR.INR.LNDP | Interest rate spread (lending rate minus deposit rate) |
| VAR8F | FR.INR.LEND | Lending interest rate (%) |
| VAR9F* | DT.DOD.DLXF.CD | Long-term debt (as a % of GDP Current LCU) |
| VAR10F | CM.MKT.LCAP.GD.ZS | Market capitalization of listed companies (% of GDP) |
| VAR11F* | BX.PEF.TOTL.CD.DT | Portfolio investment, equity (as a % of GDP Current LCU) |
| VAR12F | DT.DOD.DSTC.ZS | Short-term debt (% of total external debt) |
| VAR13F | CM.MKT.TRAD.GD.ZS | Stocks traded, total value (% of GDP) |
| VAR14F | DT.TDS.DECT.EX.ZS | Total debt service (% of exports of goods and services) |
| VAR15F | DT.TDS.DECT.GN.ZS | Total debt service (% of GNI) |
| VAR16F* | FI.RES.TOTL.CD | Total reserves (includes gold, (as a % of GDP Current LCU) |

* indicates normalized variables
5.0 Results and Analysis

5.1 Studying structural breaks

The fourteen financial variables and sixteen macro variables are chosen on the basis of literature review. We want to have our own judgment about the set of variables that are relevant for measuring the crisis. For this we have used the dummy variables exercise where in, the entire set of variables is tested for statistically significant changes, in the three crisis period mentioned before. A caution is in order in interpreting the result of dummy variables particularly in the case of difference dummies. The dummy variables will simply point out the differences, if they exist, but they do not suggest the reasons for the differences. Therefore unless we take into account the other variables that may affect the variable, we will not be able to pin down the causes of the differences.

In dummy variable exercise we have noticed using annual data that crisis develop in November 1997, as well as in many countries the crisis peaked in 1998. This is vindicated by the dummy variable exercise. Hence the crisis window of 1997-98 which we have taken earlier is correct. We have used two time period dummy, namely 1997 and 1998 in the main model. The two year window has been captured such that it shows statistically significant changes in the trend of the variables. On a sample basis a one period dummy was also tested but the result were not significant. For the result to be significant in a two period dummy, the phenomena should have significant deviation from the trend.

Where D1 is a dummy variable taking the value one if the observation in question is a crisis period and zero otherwise, D2 takes the value of 1 in the post crisis period and zero otherwise. The special “product” dummy variable D1T and D2T allow for changes in slope coefficient for one period of data to another and thereby capture a different kind of interaction effect. We also refer to such product dummies as slope dummies because they tell us the difference in slope between the trends of the variables between two time periods. In short, variable can be identified as a crisis variable if and only if either of these conditions was found to be statistically true.

Another utility of dummy variable exercise is to make a statistical judgment about the process of recovery. For instance, if neither of the D2 coefficients namely intercept and slope, are statistically significant, it implies that
the variable has attained pre-crisis levels as well as trend. Therefore it implies that the recovery was complete. If the sign of the two coefficients (intercept and slope) was same as the pre-crisis period, while the D2 coefficients are statistically significant it implies that the recovery is partial. In the third case sign may differ in the post crisis period with respect to the pre-crisis period and the coefficient may be statistically significant. This shows that shock due to crisis has completely destabilized the variable. If D1 and D2 both have the same sign it means there is no recovery in that variable. If the sign is different it signifies that there is recovery. Recovery depends upon the expected sign in the crisis window.

As stated earlier we wish to interpret the change if any in terms of the expected direction of change. We have done hypothesis testing in case of dummy variable regression analysis, by assuming the null hypotheses that the difference in the intercept (and/or slope) is zero, and meaning thereby that the intercept differs significantly from the intercept in the base period. It is only when the null hypothesis is rejected that the new intercept (or slope) in the second and third period are calculated by adding respectively D1 and D2 to the base period intercept. Otherwise they are treated as zero. In such cases only the sign of the dummies give us some notion about the direction of change.

5.2 Analysis of macro and financial variables

The interpretation of the result of dummy variable exercise is done country-wise so as to know in which country which variables have shown structural break (Figures 1 to 5). The results were interpreted at 10 per cent level of significance. A total of one hundred and eighty dummy variable regression equations were estimated. Due to lack of space, results of only those variables were quoted where the D1, D2 D1T, D2T are significant.1 Table 2 shows the list of impacted macroeconomic and impacted financial variables.

1 Full results are available with the authors.
Table 2: Impacted – Macro and Financial Variables

| Country | Impacted Macro Variables | Impacted Financial Variables |
|---------|--------------------------|-----------------------------|
| Thailand | 1. Changes in net reserves (as a % of GDP Current LCU)- 2. Current account balance (% of GDP)- 3. Exports of goods and services (% of GDP) 4. GDP growth (annual %)- 5. GDP per capita growth (annual %)- 6. Overall budget balance, including grants (% of GDP) | 1. Gross private capital flows (% of GDP)- 2. Short-term debt (% of total external debt)- 3. Total debt service (% of exports of goods and services)- 4. Total reserves (includes gold, (as a % of GDP Current LCU)- |
| Philippines | 1. Changes in net reserves (as a % of GDP Current LCU)- 2. Current account balance (% of GDP)- 3. GDP growth (annual %)- 4. Gross capital formation (% of GDP)- 5. Imports of goods and services (% of GDP)- 6. Official exchange rate (LCU per US$, period average as a % change over previous year)- 7. Real effective exchange rate index (1995 = 100)- | 1. Gross private capital flows (% of GDP)- 2. Short-term debt (% of total external debt)- 3. Domestic credit to private sector (% of GDP)- |
| Korea | 1. Changes in net reserves (as a % of GDP Current LCU)- 2. Current account balance (% of GDP)- | 1. Deposit interest rate (%)- 2. Domestic credit to private sector (% of GDP)- 3. Market capitalization of |
3. Exports of goods and services (% of GDP)
4. GDP per capita growth (annual %)
5. Imports of goods and services (% of GDP)
6. Official exchange rate (LCU per US$, period average as a % change over previous year)

| Indonesia | 1. Changes in net reserves (as a % of GDP Current LCU)
|-----------|---------------------------------------------------------------|
|           | 2. Exports of goods and services (% of GDP)
|           | 3. GDP per capita growth (annual %)
|           | 4. Overall budget balance, including grants (% of GDP)
|           | 5. Imports of goods and services (% of GDP)
| Malaysia  | 1. Current account balance (% of GDP)
|           | 2. GDP growth (annual %)
|           | 3. Imports of goods and services (% of GDP)

| Malaysia  | 1. Gross private capital flows (% of GDP)
|           | 2. Short-term debt (% of total external debt)
|           | 3. Domestic financing, total (% of GDP)
|           | 4. Interest rate spread (lending rate minus deposit rate)

| Malaysia  | 1. Market capitalization of listed companies (% of GDP)
|           | 2. Short-term debt (% of total external debt)
|           | 3. Stocks traded, total value (% of GDP)

Figures 1 to 5 represents the structural break in case of selected variables of A 5 countries. For example figure 1 represents the structural break in Domestic Credit to Private Sector in case of Thailand, figure 2 represents the Deposit Interest Rate in case of Korea, figure 3 represents the Domestic Credit to Private
Sector in case of Philippines, figure 4 represents the Stock Traded in case of Malaysia, and finally figure 5 represents the Deposit Interest Rate in case of Indonesia.²

Figure 1

![Thailand: Domestic Credit to Private Sector](image1)

Figure 2

![Korea: Deposit interest rate](image2)

² The detail of all the charts in case of all the variables which were examined in case of A5 countries is available with the researcher.
Figure 3

Philippines: Domestic Credit to Private sector

Figure 4

Malaysia: Stock traded
India

In India, in the case of changes in net reserves, nothing was significant. This means that the variable was completely stable. Throughout the period there was a constant rising trend current account balance. This variable was unaffected by crisis. In case of export of goods and services throughout the period there was a constant rising trend. This variable was unaffected by crisis; neither before nor after.

In case of annual percentage GDP growth, nothing was significant. This means that the variable was completely stable and points towards a general malaise in the economy. GDP per capita growth and gross capital formation also show similar trends. In case of import of goods and services there was a constant rising time trend before crisis. There was no significant difference during and after crisis. This variable was unaffected by crisis. Industry value-added, none of the coefficients was significant. This means that the variable was completely stable.

Inflation (CPI) was rising but did not show any variation over policy periods. It is hence unaffected by crisis. In the case of Official exchange rate
none of the coefficients were significant. This meant that the variable was completely stable. Overall budgetary balance shows that there was a constant rising time trend before crisis. There was no significant difference during and after crisis. This variable was unaffected by crisis. Although India was not directly hit by the crisis, it has somewhat faced the repercussion of the crisis episodes which East Asian economies suffered.

In the case of India except the following none of the variables were significant: Domestic credit to private sector (percent of GDP) has decreased in the beginning of the recovery period; during the recovery period it has increased as the sign of D2T was positive and significant. In the beginning of the recovery period, market capitalization of listed companies (percent of GDP) has increased as the intercept of post crisis period was positive; during the crisis period it has decreased. This phenomenon could be explained as contagion effect.

**Figure 6**

### 6.0 Conclusions

The extant studies have not actually statistically measured the trend in crisis variables and not tested to see what has been the trend in the so-called crisis variables in each of the periods. Our analysis clearly reveals the distinct
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A5 countries have passed through a crisis. Secondly, the phenomena of crisis engulfed a large number of variables both macro and financial and thirdly, the analysis also establishes that the crisis phenomena are not restricted to exchange rate variable alone. In fact it is a complex web of financial and macro variables.

This study tells us that the various macro and financial variables are correlated with each other and hence it is quite difficult to solve the thread of currency crisis and to narrow down the exact causes of crisis as is clear from the correlation results. Where majority of the variables are correlated, it is difficult to say which variable is the ‘cause’ and which variable is the ‘effect’. Further, all the variables do not show the same trend in case of all the crisis hit countries as is clear from the dummy variable exercise. In some countries, some variables have shown structural break while at the same time in some other countries the same variables were not significant.

The five Asian countries – Indonesia, Korea, Thailand, Malaysia, and Philippines have managed some recovery from the crisis that broke out in 1997. The economies started to bottom out in the second half of 1998. We believe that a large number of macro and financial factors are responsible for the deeper crisis and the recovery in East Asia. The origin and the nature of the shock, initial conditions, the development of external environments, and the stabilization and structural adjustment policies taken must have a significant consequence on the adjustment path as they did in the eruption of the crisis.

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