Recovery and Sustainability in East Asia *

Yung Chul Park and Jong Wha Lee

Korea University

Preliminary draft: March 2001

Abstract

This paper analyzes the macroeconomic adjustment from the crisis in East Asia in a broad international prospective. The stylized pattern from the previous 160 currency crisis episodes over the period from 1970 to 1995 shows a V-type adjustment of real GDP growth in the years prior to and following a crisis. The adjustment shows a much sharper V-type in the crisis episodes with the IMF program, compared to those without. Cross-country regressions show that depreciation of real exchange rate, expansionary macroeconomic policies and favorable global environments are critical for the speedy post-crisis recovery. In this sense, the East Asian process of adjustment is not much different from the stylized pattern from the previous currency crisis episodes. However, the degree of initial contraction and following recovery has been far greater in East Asia than what the cross-country evidence predicts. This paper argues that the sharper adjustment pattern in East Asia is attributed to the severe liquidity crisis that was triggered by investor's panic and then amplified by the weak corporate and bank balance sheet. We find no evidence for a direct impact of a currency crisis on long-run growth.

* A paper prepared for Conference on Management of Currency Crises, NBER on March 28-31, 2001. Si-Yeon Lee and Do-Won Kwak provided able research assistance. Authors' e-mail addresses: ycpark@soback.kornet21.net, jongwha@korea.ac.kr

I. Introduction

Over the last three years, the five Asian countries--Indonesia, Korea, Thailand, Malaysia, and Philippines—have managed impressive recoveries from the crisis that broke out in 1997. The recoveries have been faster than expected by anyone. The economies started to bottom out in the second half of 1998. The rebounding of growth rate in 1999 was no drastic than its free-fall. In Korea, for example, the growth rates showed a turnaround from –6.7% in 1998 to 10.7% in 1999.

Even more encouraging is the expectation that the recovery currently underway may continue to move forward in the next few years, raising the hope that these economies may return to the pre-crisis level of performance. According to preliminary figures, the growth outturn for 2000 is predicted to be higher than in 1999 in all countries except Korea.

The purpose of this paper is to make an assessment of this speedy adjustment from the crisis in East Asia. In particular, we analyze the macroeconomic adjustment process of the East Asian currency crisis in a broad international perspective. First, we assess the impacts of the crisis on GDP growth using a cross-country data set, which compiled all currency crisis episodes over the period from 1970 to 1995. From these cross-country data, we draw some stylized facts about the adjustment of key macroeconomic variables during the crisis. Then we investigate on the critical factors that determine the adjustment process.

Our analysis of cross country patterns shows that GDP growth rates drop with the eruption of a crisis but then recover quickly to the pre-crisis level in two or three years, showing a V-pattern of adjustment. Thereafter, the GDP growth rates tend to rise slightly above the pre-crisis levels, but then bounce back to a more sustainable level. We also compare the adjustment patterns of GDP growth rates between two subgroups of the currency crisis episodes- one with conditional financial assistance from the IMF and the other without. We find that the adjustment process was much sharper in the

group of the crisis episodes with the IMF program, compared to those without. That is, in the IMF program countries, GDP growth rates start to fall precipitously even before the eruption of a crisis but then recover to its pre-crisis level more quickly in two years.

The macroeconomic adjustment process in East Asia is in general consistent with these stylized patterns. However, the degree of initial contraction and following recovery has been far greater in East Asia than what the cross-country evidence predicts. This paper tries to make an evaluation on what factors contributed to the sharper contraction and the quicker recovery in East Asia compared with the cross-country patterns.

As we will discuss in section III, we believe that a large number of internal and external factors are responsible for the deeper crisis and the quicker 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. From cross-country regressions based on the sample of previous crisis episodes, we find that depreciation of exchange rate, expansionary macroeconomic policies and favorable global environments are the critical determinants of the post-crisis recovery. In the regression, the financial assistance from the IMF is found to have no independent impact on the recovery process.

We find that the quick recoveries in East Asia have been largely driven by the accommodating macroeconomic policies, favorable external environments, and its more export-oriented structure. Korea, Malaysia and Thailand shifted to a relaxation of monetary and fiscal policies by the second half of 1998, and then their economy took off. The sharp real depreciation of currency must have a bigger impact on more open Asian economies. Favorable external development also helped the quick improvement in East Asian exports. In this sense, the East Asian process of adjustment is not much different from the stylized pattern from the previous currency crisis episodes over the period from 1970 to 1995. However, the stylized pattern of adjustment cannot explain

why the crisis was severe and the recovery has been much faster than what was expected from the previous experiences of crisis. This paper argues that the sharper adjustment pattern in East Asia is attributed to the severe liquidity crisis that was triggered by investor's panic and then amplified by the weak corporate and bank balance sheet.

The stylized pattern of real GDP growth from the cross-country episodes displays that the crisis-hit countries can recover their pre-crisis or non-crisis average growth rate in three years after the crisis. Hence, it raises a question on whether the East Asian economies will be able to return to the pre-crisis trend rate of growth.

Although the financial crisis of 1997 abruptly brought a halt to Asia's period of robust growth, there was little in Asia's fundamentals that inevitably led to the crisis. This paper discusses the long-term prospects for growth in East Asia. From the cross-country regressions, we find that there is no evidence for a direct impact of a currency crisis on long-run growth. This suggests that with a return to the core policies that resulted in rapid growth, the East Asian economies can again return to sustained growth.

The paper is organized as follows. Section II discusses the methodology for our cross-country analysis and presents central features in the macroeconomic adjustments of the crisis hit countries. Then, in section III, using regression analysis based on the cross-country data, we assess the factors that can explain the behaviors of GDP growth rates during the crisis. Section IV reviews the recent recoveries in East Asia and compares them with the stylized patterns from the cross-country analysis. We analyze the driving forces of the faster recovery in East Asia. Section V discusses the issue of the sustainability of the current recovery. Concluding remarks are found in a final section.

II. Cross-Country Patterns of Adjustment to Currency Crisis

II.1. Data and Methodology

In order to assess the post-crisis adjustment of the crisis-hit countries, one needs first to define a currency crisis. Several alternative indicators and methods have been used in the literature to identify the year when a crisis erupted in each country. Frankel and Rose (1996) and Milesi-Ferreti and Razin (1998) used the nominal depreciation rate of the currency. Sachs, Tornell and Velasco (1996), Radelet and Sachs (1998), and Kaminsky and Reinhart (1999) combined the depreciation rate with other additional indicators such as losses in foreign reserves, increase in the interest rate, and reversal in capital accounts to identify the crisis.

Each definition still has own limitations. A large-scale depreciation can occur orderly without a speculative attack. Identifying unsuccessful speculative attacks is a difficult task. Reliable data on reserves and interest rates in developing countries are often unavailable. Lee and Rhee (2000) suggested an alternative measure based on the initiation of an IMF stabilization program. But, countries often receive the IMF program after a crisis broke out or without a currency crisis. Governments may sign an IMF agreement not necessarily because they need foreign exchange, but because they want austerity conditions to be imposed (Przeworski and Vreeland, 2000).

Since the purpose of this paper is not to improve the measure of a currency crisis, we use the conventional nominal depreciation rate of the currency as a benchmark measure. But, in contrast to Frankel and Rose (1996), we use quarterly data, instead of annual data, to define a currency crisis. That is, a country is judged to have a currency crisis in the specific year when it has a nominal depreciation of currency of at least 25 percent in any quarter of the year and the depreciation rate exceeds the previous quarter's change in the exchange rate by a margin of at least a 10 percent. Thus, our definition captures the incidences of currency crises that were severe but short-lived, perhaps due to successful interventions in the foreign exchange market. During the period from 1970 to 1997, the total number of currency crises was 239. We use a window of plus/minus two years to identify an independent crisis. That is, if there were a precedent crisis within two

years before a crisis, we count it as a consecutive crisis, but not an independent one. This procedure yields a total of 160 currency crisis episodes. [1]

Then, we divide all crisis episodes into two groups based on whether the crisis-hit countries entered into an IMF program or not. We have compiled data on all types of IMF programs that include stand-by arrangements, extended fund facility (EFF) arrangements, structural adjustment facility (SAF) and enhanced structural adjustment facility (ESAF) over the period from 1970 to 1997.[2] The program is identified by the year when the loans are approved. Thus, if a country received a financial assistance from the IMF during the year or one year after the currency crisis, we consider it as a case of a currency crisis with the IMF program. Note that the decision on the participation in the IMF program following a currency crisis can be determined endogenously by various factors. A country may enter into agreements with the IMF when it faces a more severe foreign reserve crisis or a worse macroeconomic situation (Conway, 1994). But, relying on the IMF conditionality may be just a way to impose domestically unpopular austerity policies (Przeworski and Vreeland, 2000).

*Insert <Table 1>

Table 1 shows a summary of data on currency crises based on our definition during the period from 1970 to 1995. There were 160 currency crisis episodes during this period. The number of crises were increasing over time, from 33 in the 1970s, to 55 in the 1980s and 72 in the 1990s (1990-97). According to this data set, the number of countries that experienced at least one crisis was 96.[3] Thus, on average each country had 1.7 crises over the period. Out of the 160 crisis episodes, 53 of them participated in an IMF program.

[1] Lee, Hong, and Rhee (2001) describe the data in more details. We are grateful to Kiseok Hong and Changyong Rhee for sharing their cross-country data set.
[2] The data come from Lee and Rhee (2000), which compiled the information from the IMF, *Annual Report* for each year.
[3] The sample does not include the former Soviet Union countries that experienced currency crises and

II. 2. Macroeconomic Adjustment During the Currency Crisis

On the basis of the currency crisis index, we investigate how the crisis-hit economies, on average, behave during the five years prior to and following the crisis. We first look at the movement of growth rates of real GDP and then investigate the sources of output changes by looking at the movements of GDP expenditure components and major macroeconomic policy variables in the typical crisis-hit country during the period before and after the crisis. The behavior of the macroeconomic variables between the two subgroups- one with conditional financial assistance from the IMF and the other without- is also compared. The data cover the period from 1970 to 1995. Thus we attempt to draw the stylized pattern of macroeconomic adjustment from the crisis episodes that had occurred prior to the Asian crisis.

Real GDP Growth

Figure 1 shows the movements of the average GDP growth rates during the five years prior to and following the crisis; that is, from t-5 to t+5 in which t is the year of a currency crisis. For comparison, we include a straight line, which indicates the average GDP growth rate during the tranquil period that did not experience a currency crisis or enter into an IMF program within a window of plus/minus two years.

In general, we find that the growth rates, on average, exhibit a v-type pattern of adjustment over the period before and following the crisis. The growth rates during the pre-crisis period from three to five years prior to the crisis are slightly lower than the average during the tranquil period of 3.5%. The growth rate continues to decline over time, from 3.0% in t-4 to 1.4% in t-1, implying that economic conditions are aggravated prior to the eruption of a crisis.

---

subsequently received the financial assistance from the IMF in the early 1990s.

The growth rate increases slightly in the crisis year, which confirms that most currency crises have indeed been expansionary. As in Gupta et al.(2000), we also find that about 70 percent of the currency crises in our sample lead to an output increase in the crisis year. The average GDP growth rate of the crisis-hit countries remains at 1.9% over the crisis year and one year after. But the GDP growth rate recovers its non-crisis level quickly in three years after the crisis, reaching 4.0% in t+3 that is about 0.5 percentage point higher than the average of the non-crisis economies. Thus, the growth rate tends to exceed its pre-crisis or tranquil period average, indicating that after a crisis the country' level of GDP returns to the level of its pre-crisis growth path. Eventually, the growth rate tapers off and returns to the level of the tranquil period in four and five years after the crisis. This V-type pattern and the speed of recovery are broadly consistent with the findings in Hong and Tornell (1999) and Gupta et al.(2000).

*Insert <Figure 1>

Figure 1 compares the behavior of the GDP growth rates between the two subgroups- one with conditional financial assistance from the IMF and the other without. We find that the adjustment process shows a much sharper V-type in the program countries than in the non-program countries. The program countries start with lower growth rates of around 2.0% in t-4 and continue to slow down. They reach the trough, where the growth rate is –1.0%, in one year prior to the initiation of the currency crisis.

This magnitude of decline in growth rates is much larger than that of the non-program countries. At the trough, the growth rate of the crisis-hit program countries is about 1.5 percentage point lower than that of the non-crisis economies. Thereafter, rebounding from the deeper trough, the program countries show a quicker recovery. The GDP growth rate begins to recover from the crisis year and reaches its pre-crisis level quickly within two years after the onset of a crisis. The non-program countries also begin

to recover a year after the crisis and then their growth rates stabilize at the non-crisis level from t+3.

The fact that the program countries have much lower growth rates than the non-program countries confirms that only a very seroius macroeconomic situation forces a country to enter into agreements with the IMF. Nevertheless, it is intriguing that the crisis-hit countries show a quicker recovery from a deeper recession with the participation in the IMF program.

GDP Expenditure Components

Figure 2-(a) to (f) show the movements of the components of GDP expenditure during the five years prior to and following the crisis.

Panel (a) shows that the share of private consumption expenditure in GDP remains stable over the period. In other words, consumption moves closely with GDP. The adjustment pattern is similar in both program and non-program countries. For the overall period, the consumption to GDP ratio in the crisis-hit economies exceeds the non-crisis tranquil period average, indicating that private consumption is high in the crisis-hit countries and even after a crisis these countries' level of private saving does not increase to the level of the non-crisis countries.

Panel (b) of Table 2 shows that in contrast to consumption, the investment (private plus public investment) ratio shows more fluctuations. The level is no higher in the crisis-hit economies than in the non-crisis countries. For four to five years prior to the crisis, the investment ratio remains at an average level of tranquil observations of 22.0%. Thus, a stylized fact is that the crisis-hit countries have had 'over-consumption' but not necessarily 'over-investment', compared to the level of the non-crisis countries. In the crisis-hit countries, the investment rate tends to decline during the pre-crisis period, reaching 20.0% in the crisis year. After the crisis, the investment rate increases gradually but does not return to the level of the pre-crisis or tranquil period, remaining at 21.2% for

five years following the crisis. A popular claim regarding the role of the IMF conditionality is that the austerity program has an adverse effect on investment. Panel (b) of Table 2 seems to support this claim. The IMF program countries have experienced a more severe investment contraction than the other group in the pre-crisis period, as the investment ratio declines continuously from 21.5% in t-5 to 18.2% in t. In the post-crisis period of the crisis-hit countries in which an IMF program is introduced, the investment rate does not recover to the pre-crisis level, remaining at 19.2% in t+4 and t+5. In contrast, the investment rate returns to the pre-crisis level in the non-program crisis-hit countries in five years after the crisis.

*Insert <Figure 2-(a) to (f)>

In the crisis-hit countries, domestic expenditure or demand is either slowly recovering or remains permanently below the pre-crisis level. In contrast, export demand shows a quick recovery during the post-crisis period. Panel(c) shows that in the crisis-hit countries, real export growth rates jump from less than 2% in the crisis year to 6.0% in t+1 and remain at over 5% over the post-crisis period. For both program and non-program countries, export growth during the post-crisis period is faster than that of the pre-crisis or tranquil period, and thus leads a strong recovery. Consequently, as shown in Panel (d) of Figure 2, after the currency crisis the export share increases permanently above the pre-crisis level. But, note that on average the export share in all crisis-hit countries is still lower than that of the non-crisis average.

During the early post-crisis period the quick recovery of export growth is accompanied by a contraction of import demand. The pattern of import reduction is more conspicuous in the program countries where import growth rates are negative over the period from t-1 to t+1. Panel (e) and (f) of Figure 2 show that although the growth rate of import recovers to the pre-crisis level in two years following the crisis, its share in GDP remains permanently below the pre-crisis level. The growth of exports and imports shows

that the current account to GDP ratio improves quickly after the crisis. Thus, net exports tend to lead the recovery in the crisis-hit countries.

Macroeconomic Policy Indicators

Public consumption is an indicator of fiscal policy. Panel (a) and (b) of Figure 3 show that public consumption growth rates tend to slow down slightly in the crisis year, and then recover to the pre-crisis as well as non-crisis average. But in the first year following the crisis, there is a contrasting behavior between the program-countries and non-program countries. While the public consumption growth rate is over 6.5% for the non-program countries, it is –5.1% for the program countries in the year of t+1. It confirms that an agreement with the IMF introduces a contractionary fiscal policy in the program country. Reflecting this sharp contraction in public consumption expenditure, the ratio of public consumption to GDP declines quickly in t+1 with the IMF program. The ratio remains at the level lower than the pre-crisis or non-crisis average in both program and non-program countries even five years after a crisis.

*Insert <Figure 3-(a) to (e)>

Like fiscal policy, monetary policy of the program countries contrasts sharply with that of the non-program countries. Panel © of Figure 3 shows that the real money supply growth rate remains positive throughout the years following the crisis and increases over time to return to the pre-crisis level in five years after the crisis in the non-program countries. In contrast, in the sample of the crisis-hit countries with the IMF program participation money supply growth is negative. Thereafter it returns to the pre-crisis average growth rate. The sharp reduction in money supply in the program countries implies that, as in fiscal policy, participation in an IMF program brings in tight monetary policy in the crisis-hit economy.

It is claimed that a currency crisis often develops into a banking crisis. As international lending declines suddenly, a weak banking sector is unable to play a proper intermediation role. Banks reduce the supply of credit to the private sector. Panel (d) shows that credit supply growth indeed slows down in the crisis-hit countries. For four to five years prior to the crisis, the real credit growth rate is 7.4%, which is about the average of tranquil observations. Thereafter credit growth rates decline over time, reaching –1.6% in the crisis year. Even five years after the crisis, credit growth does not return to the level of the pre-crisis or tranquil period. The slow down of real credit growth is more pronounced in the IMF program countries. The supply of real credit declines by more than 10% in the year following the crisis and thereafter continues to slow down throughout the post-crisis period.

The robust growth of net exports during the post-crisis period is likely to be related to the real exchange depreciation associated with (or caused by) the currency crisis. Panel (e) of Figure 3 shows that a currency crisis causes a sharp real depreciation of the exchange rate by about 15% in the crisis year. The real exchange rate also depreciates by 5.8% in the year following the crisis. Thereafter, it appreciates about 2% per year. Hence, the real exchange remains higher (depreciation) after the crisis. The pattern of adjustment in the real exchange rate is similar in both the program and non-program countries.

III. Determinants of the Post-crisis Recovery

We believe there are a large number of factors that determine the stylized pattern of adjustment in real output growth in the crisis-hit countries. Broadly speaking, there are four major factors that influence the adjustment pattern- (i) the origin and nature of the shock, (ii) initial conditions, (iii) domestic policies, and (iv) external environments.

Origin and Nature of the Shock

The origin and nature of the shock that has provoked a crisis can influence the evolution of the crisis. Many currency crises can be attributed to macroeconomic mismanagement- large budget deficits and consequent monetary expansion in a fixed exchange rate regime- as the Latin America debt crisis in the early 1980s was. In this case, real depreciation of the currency and contraction of domestic absorption help to restore internal and external balance, leading to improvement in the economy.

Investors' panic can intensify the effects of speculative attacks on currency. In particular, when the capital account is liberalized, a bad expectation by foreign investors can easily lead to a sudden reversal of foreign lending, thereby causing a significant contraction of the domestic economy. In particular, the adverse impact will be magnified if domestic corporations and financial institutions are heavily leveraged by large, unhedged, and short-term foreign currency debts. When a sharp and unexpected depreciation wreaks havoc with highly leveraged corporate and bank balance sheets, a sudden reversal of capital flows exacerbates the downturn in investment and the economy (Krugman, 1999). But, once the investors' panic calms down and foreign capital resumes to flow in, the economy can rebound quickly back to its long-term trend.

Initial Conditions

Differences in initial conditions could result in different patterns of adjustment. For example, structural variables such as per capita output and openness could be important in determining the pattern of post-crisis recovery.

The level of initial per capita GDP can influence the growth rate in the post-crisis period. In the growth theory, a country with a lower initial per capita GDP is in a more favorable position for future growth. The fundamental idea is that the gap in existing

capital and technology between the current and steady-state levels offers a chance for rapid "catching up," via high rates of capital accumulation as well as the diffusion of technology from more technically advanced economies. In addition, when a currency crisis leads an economy to a lower level of per capita income relative to that of its own trend, the subsequent growth rate of the economy that rebounds to its potential growth would be higher.

Openness can also influence the speed and extent of the post-crisis recovery. When the economy is more export oriented, a quicker improvement in the current account follows a currency devaluation. Lee and Rhee (2000) argue that the quick recovery of the Korean economy may have been possible because of its openness and export orientation. A more export oriented economy benefits more from devaluation after the crisis, and a subsequent improvement in the current account could in turn help restore foreign investors' confidence and hence stability in the foreign exchange market.

Several studies also point out that the behavior of macroeconomic variables prior to the crisis can influence the degree of real output contraction. For example, a rapid expansion of bank credit or lending boom during the pre-crisis periods is critical to the post-crisis recovery (Sachs, Tornell, and Velasco, 1996, and Hong and Tornell, 2000). Gupta et al.(2000) find that the higher the size of short-term external debt and the amount of private capital flows are in the years prior to the crisis, the more severe is the contraction of output during the crisis-period.

Policy Factors

Macroeconomic and structural reform policies implemented by the government for the crisis management can play a key role in the post-crisis adjustment of real output. Fiscal policy has a direct impact on domestic demand. Monetary policy plays a critical role in determining domestic consumption and investment.

In addition to the macroeconomic stabilization policies, structural reform programs can have significant effects on the adjustment path. It is often argued that the structural reform introduced by the IMF plays a catalytic role in resuming foreign trade and private capital inflows to and thus contributes to the fast recovery of a crisis-hit economy as the commitment to the reform program improves foreign investors' confidence in the economy. The critics of the IMF program, however, argue that the implementation of financial restructuring in conjunction with contractionary macroeconomic policies can make a credit crunch more severe than otherwise after the crisis.

For external demand, a larger depreciation of real exchange rate is expected to increase export earnings while cutting down import demand to improve the current account.

External Environments

A global economic environment is also critical to in the post-crisis adjustment of crisis-hit countries. Business fluctuations of the world economy can influence post-crisis growth as they have a substantial impact on the terms of trade and export earnings of the crisis-hit country.

To the extent that the relevant data are available, we carry out an empirical assessment of the factors determining the pattern post-crisis recovery. The explanatory variables that we consider to explain the speed and the extent of post-crisis recovery include per capita real GDP in the crisis year, world economic growth, which is an average of per capita GDP growth rates of a crisis-hit country's trading partners weighted by its trade share, an interactive term of the real exchange depreciation rate

with openness (trade-GDP ratio), real public consumption growth, and real money supply growth. We also include an investment rate.[4]

The regression also includes a dummy variable for the IMF program countries to see if the participation in an IMF program had any impact on the recovery process. Upon entering an agreement with the IMF, a member government subscribes to the IMF conditionality that typically entails fiscal austerity, tight monetary policy, and currency devaluation. Since we include macroeconomic policies variables separately in the regression, the dummy variable may be able to capture the effect of the IMF program participation in post-crisis recovery.

We also control the differences in country-specific factors that may influence the potential growth path, by including the average growth rate for three to five years prior to the crisis. However, we do not include the pre-crisis macroeconomic policy variables in the regressions, for the impact of these variables on the post-crisis recovery are extensively discussed in Hong and Tornell (1999) and Gupta et al. (2000). Also, we cannot incorporate any variables that measure structural vulnerabilities of the corporate and financial sectors due to the lack of broad cross-country data.

The dependent variable in the regression is the average growth rate of real GDP during the post-crisis period over k years.

.

$$(1) \qquad y_{i,t+k} = \frac{1}{k}\sum_{j=1}^{k}(\ln GDP_{i,t+j} - \ln GDP_{i,t+j-1}), \quad i = 1,..., N,$$

where $GDP_{i,\,t+j}$ is real GDP for country i in the j years after the crisis year (t) and N is the number of crisis episodes in our sample. Then, $y_{i,t+k}$ represents the real GDP growth rate, averaged over the post-crisis period of k years. Because we are mostly interested in short-term recovery, we choose k from 1 to 5. In the previous literature, k is often

[4] Investment ratio can be considered an endogenous variable. The regression results do not change qualitatively when we have exclude investment ratio in the regressions. Note that investment includes public investment in addition to private investment. The regressions for investment rate are presented in Table 4.

chosen arbitrarily, and thus cross-section data in which each country had only one observation is used for empirical investigation. Our framework differs significantly in that we use panel data. Thus, we utilize both cross-section and time dimension information. Our regression specification is as follows.

$$(2) \qquad y_{i,t+k} = \beta' x_{i,t+k} + \varepsilon_{i,t+k}, \quad i = 1,...,N, \quad k = 1,...,5.$$

where x denotes the vector of the explanatory variables. Note that some independent variables such as real GDP in the crisis year, pre-crisis average growth rate, and an IMF program dummy are identical across all five equations. Fiscal and monetary policy variables are included as an average over the period from the crisis year t to the post-crisis year $t+k$, while real exchange depreciation is an average over the period from the year t to $t+k-1$.

We estimate this system of the five equations by a seemingly unrelated regression (SUR) technique that corrects for heteroskedasticity in each equation and correlation of the errors across the equations.[5]

*Insert <Table 2>

Table 2 displays our estimates of the basic regression for post crisis recovery at various horizons that was applied to a total of 95 previous crisis episodes during the period from 1970 to 1995.

We find a strong and statistically significant negative relation between the initial real per capita GDP and the post-crisis growth rate at all horizons, implying that countries with lower per capita income tend to have larger increases in GDP growth over the period after the crisis. The impact of initial GDP on the post-crisis recovery is

[5] Another problem can occur in this regression when X_i - the control variables - are endogenously determined. To avoid this simultaneous problem, we need to use an instrumental-variable technique. We do not implement this approach yet due to lack of ideal instruments.

much larger in the year following the crisis, but then become smaller in the later years of the post-crisis period. The estimated coefficients imply that a 10 percentage point drop in per capita GDP in the crisis year is associated with a 0.2 percentage point (2.09*ln(0.9)) decrease in GDP growth in the first year after a crisis erupted, but with a 0.1 percentage point on average over five years after the crisis.

The world growth variable also has a significantly positive coefficient in most of the regressions. The impact of the world growth variable on the post-crisis recovery is also much larger in the year following the crisis, but then tapers off over time. The estimated coefficient implies that a one percentage point increase in world per capita GDP growth is associated with a 0.5 percentage point increase in GDP growth of the crisis-hit country in the first post-crisis year, but only with a 0.1 percentage point higher GDP growth on average over the five-year post-crisis period.

The result also confirms the strong association between investment and GDP growth over the period of adjustment in the crisis-hit economies. The coefficients show that an increase of a 10-percentage point in the ratio of investment to GDP is typically associated with an increase in the growth rate of about 1.2 percentage point per year.

Among the macroeconomic policy variables, the fiscal variable (measured by public consumption growth) turns out to be most significant for the recovery in all post-crisis periods except for the year of t+1. The estimated coefficients imply that an increase of the public consumption growth rate by a 10 percentage point leads to an increase in GDP growth rate by 0.6%~0.9%.

In contrast to the positive and significant contribution of fiscal policy, monetary policy turns out to be less important for post-crisis recovery. The average growth rates of real money supply are significant in only one equation where the dependent variable is the average GDP growth over the three years after the crisis. One might argue that the weak effect of monetary policy on real output even in the short-run is not credible. However, in our view, the real impact of monetary policy is ambiguous in the crisis-hit economies. Contractionary monetary policy which is part of the IMF programs can

contribute to post-crisis growth as it helps stabilize prices and improve the current account.[6]

The test shows that the interactive term between trade share and exchange rate depreciation variables have a significant impact on the post-crisis GDP growth. But the output effect of real depreciation turns out to be significant only in a few years following a crisis. The estimated coefficient shows that for the country with the average openness ratio of 0.6, a real exchange depreciation of 10% raises real GDP growth rate by 0.3% per year over the four years after the crisis.

We also examined whether the agreements with the IMF had any impact on the post-crisis recovery. The estimated coefficient turns out to be statistically insignificant. Hence, there is no evidence that IMF programs had any significant impact on the recovery process after a currency crisis, when other factors were controlled.

*Insert <Table 3>

In order to examine the factors that determine the change of the average growth rate in the post-crisis period from the trough in the crisis-period, we also estimated another specification by using the reversal of GDP growth rate between the crisis-hit (that is, t-1 and t) and the post-crisis period, instead of post-crisis GDP growth, for the dependent variable in the regressions. The results are presented in Table 3. We find the results are very similar to those in Table 2.

Macroeconomic policies may have an additional impact on growth by influencing the level of investment. Table 4 shows the results of regressions for the investment rate. We find that both public investment and real money supply growth play a quite significant role in promoting investment from the beginning of the post-crisis period, while exchange rate depreciation is insignificant. The estimated coefficient for public investment suggests that an increase of 1 percentage point in the

[6] Goldfajn and Gupta (1999) find that the use of tight monetary policy is accompanied with a sharper

ratio of public investment to GDP contributes to an increase in the total investment ratio by more than 1 percentage point, between 1.3 and 1.5. Hence, public investment increases total investment more than one for one, implying that public investment does not 'crowd out' equal amount of private investment from domestic sources by competing in product markets or financial markets. Thus, public investment, perhaps by improving the condition of social infrastructure, stimulates private investment and thus contributes to the post-crisis recovery by augmenting capital accumulation. An increase in real money supply growth by about 10 percentage point leads to an increase in investment-GDP ratio by about 2.0 percentage point per year.

*Insert <Table 4>

IV. Assessments of the Recovery Process in East Asia

IV.1. Macroeconomic Adjustments in East Asia

The economic turmoil that broke out in Thailand in July 1997 swept through East Asia and its devastating impact was much more severe than anyone had expected. The countries that fell victim to the crisis suffered a sharp reduction in real income. In 1998, the growth rate plunged from the pre-crisis average of 7.0% to -13.2 % in Indonesia, -10.4 percent in Thailand, -7.5% in Malaysia, -6.7% in Korea, and -0.6% in the Philippines. However, since 1999 the five crisis-hit Asian countries have managed impressive recoveries, which have been faster than the similar episodes of recovery in other parts of the world before. The rebounding of the growth rate in 1999 was no less drastic than its free-fall. Korea stood out as the best performer in that year by growing 10.7%. For the other countries, the growth rate ranged from 5.4% in Malaysia to 0.2% in Indonesia.

---

recovery of output during the currency crises.

With the passage of time, the recovery process has gained momentum. The growth outturn in 2000 is projected to be higher than that of 1999 in four of the affected economies- Indonesia, Thailand, Malaysia, and the Philippines. In Korea, the growth rate is expected to slow down to 8.3%.

*Insert <Figure 3>

Figure 3 shows the GDP growth rates of the five affected economies. The adjustment process in East Asia that can be inferred from changes in the growth rates seems to be in general consistent with the stylized V-pattern we observe from the previous crisis episodes. However, the East Asian experience is in marked contrast to the stylized pattern of adjustment in GDP growth in that the degree of initial contraction and subsequent recovery has been far greater than what can be predicted from the previous cross-country evidence.

The initial GDP contraction in 1998 was largely caused by the collapse of investment: the level of domestic capital formation plummeted in all five countries in 1998. The contraction amounted to more than 30% in Indonesia, Malaysia and Thailand, 17% in Korea, and 9% in the Philippines (Table 4).

Compared to investment demand private consumption fell to a lesser degree. The consumption-GDP ratio remained mostly stable in the crisis period, which is consistent with the cross-country stylized pattern. On the contrary, the investment-GDP ratio dropped sharply. In Korea, for example, it fell from 33.4% in 1997 to 22.0% in 1998. Investment demand started to recover somewhat in 1999 in Korea and Malaysia, but it has continued to decline in the other countries.

*Insert <Table 5>

While domestic demand was sluggish, a large increase in net export paved way for the initial recovery of the Asian economies. Import demand declined in all of the crisis-hit countries in 1998 by a substantial amount, ranging from 22% in Korea and Thailand and 5.3% in Indonesia, while exports continued to grow or remained countries.

*Insert <Figure 5> and <Figure 6>

It is therefore clear that net exports clearly led the recovery in East Asia. Figure 5 and 6 based on quarterly data demonstrate the pattern of adjustment in more detail. A close examination of the quarterly rates of GDP growth show that both Korea and Thailand reached the trough as early as in the second quarter of 1998, and Indonesia, Malaysia and the Philippines two quarters later (see Figure 5). Overall, the recession in East Asia bottomed out in the second half of 1998, less than a year after the crisis had broken out. As shown in Figure 6, the subsequent recovery in 1999 was led mostly by a surge in net exports. Over the post-crisis period private consumption to GDP ratio has remained stable in all countries except for Indonesia. In Indonesia, private consumption expenditure rose in 1998. In Korea and Malaysia, the investment rate started to increase from the latter half of 1998, whereas in the other countries the investment ratio has declined.

An increase in public investment appears to have contributed to the resurgence of total investment expenditure in Korea and Malaysia. Table 4 shows that in both countries the fraction of government capital expenditure in total investment jumped from 11% in 1997 to over 21%.

The large depreciation of currency has backed up the quick surge of net exports since 1998. Table 4 and Panel (b) of Figure 7 show that the level of real effective exchange rates in the five crisis-hit East Asian countries depreciated by 22% on average, ranging from 12% in Thailand to 50% in Indonesia in 1998.

IV. 2. Engines of the East Asian Recovery

A large number of internal and external factors are likely to have contributed to the pattern of macroeconomic adjustment to the crisis in East Asia. On the basis of the cross-country evidence and available information on the pattern of macroeconomic adjustment in East Asia, we attempt to identify some of that factors that have engineered the post-crisis recovery.

IV. 2.1. Macroeconomic Factors

According to the empirical examination of the stylized pattern of adjustments from the previous 160 currency crisis episodes over the period from 1970 to 1995, which show a V-type adjustment of real GDP growth, a large real depreciation, expansionary monetary and fiscal policy, and an improvement in the global economic environment have been responsible for the upturn of the crisis-hit countries. In this sense, the East Asian process of adjustment is not much different from the stylized pattern. The same factors contributed to the quick post-crisis recovery of the East Asian economies.

Exchange Rate Depreciation and Openness

An important structural factor driving the speedy adjustment in East Asia may have been the region's higher level of openness. With a relatively large trade sector and export-orientation, these economies benefited from a large depreciation of the real exchange rate. The level of openness in terms of the share of export and import in GDP ranges 200% in Malaysia to 60% in Indonesia. Thus, compared to other crisis-hit economies before, the depreciation is likely to have had a bigger impact on the more open East Asian economies. Note that the size of real exchange depreciation in the East

Asian countries was comparable to the average depreciation rate in the previous crisis episodes.

One special feature of the East Asia crisis is that compared to the cross-country evidence, the impact of depreciation on real output showed up as early as one year after the crisis. The large real exchange rate depreciation therefore restored external balance without much delay in East Asia. The flexibility in the labor market may have facilitated this swift adjustment, since the shift of resources from the non-tradeables to the tradeables sector elicited by the massive real exchange rate depreciation requires flexible factor market.

Favorable External Environment

The quick improvement in East Asian exports has been supported by favorable external developments. The Global economy was strong in 1999. The US economy has been able to absorb a large amount of exports of the East Asian economies. The US per capita GDP growth rates were 3.3- 3.4% in 1998 and 1999, and jumped to 4.4% in 2000, which by far exceeded the average growth rate of 2.0% over the period from 1970 to 1995. As we saw from the cross-country regressions in section III, global economic growth has a strong impact on the post-crisis recovery, in particular in the early years following the crisis. The deterioration in terms of trade that precipitated the crisis has been reversed since 1999. In particular, the increase in the prices of semiconductors have helped to boost Korean, Malaysian, and Thai exports.

Macroeconomic Policy Adjustment

Concerning macroeconomic policy management, the swift change in policy stance toward expansion has supported a quick recovery of the crisis-hit economies. In Korea relaxation of monetary and fiscal policy began around in April of 1998. A

comparison of the turning points in the adjustment process measured by annual growth rates of the quarterly GDP with the timing of policy changes, broadly speaking, confirms that easing of monetary and fiscal policy has quickened the pace of recovery in both Thailand and Malaysia (Figure 7). Thailand shifted to a modest relaxation of macroeconomic policy in June 1998, and its economy took off in the fourth quarter of the same year after zero growth in the preceding quarter. In particular, public consumption expenditure increased significantly in the latter half of 1998. It was not until the third quarter -- the end of August -- of 1998 when a relaxation of monetary and fiscal policy was announced in Malaysia, and its economy moved out of the trough a quarter later. In Indonesia, on the contrary, because of the continuing weakness of the Rupiah, monetary policy remained contractionary until the second quarter of 1999. But, public consumption increased sharply in the third quarter of 1999. This expansion boosted output growth in 1999. In Philippines, monetary policy was slightly contractionary over the post-crisis period, while public consumption expenditure has been growing since the first quarter of 1999.

Although monetary supply began to expand as in early as in the second quarter of 1998, the investment ratio did not increase in both 1998 and 1999 in the crisis-hit countries except for Korea (Panel (b) of Figure 6). This sluggishness may reflect the continuous slow down in the supply bank credit in real term in these economies. Real bank credit has declined significantly in East Asia, and more than three years after the crisis, real credit supply still remains below the pre-crisis level yet.

The positive role of expansionary macroeconomic polices in post-crisis recovery raises the question of whether the initial tightening of monetary and fiscal policy was too harsh, maintained for too long and as a consequence deepened the crisis. In order to deal with the crisis itself -- stopping bank runs, protecting the payment system, and stemming capital outflows, the IMF prescribed tight monetary policy together with fiscal austerity, which initially led to a sharp increase in interest rates. The contractionary monetary and fiscal policy has been criticized by many including

Radelet and Sachs (1998) and Feldstein (1999) as having been unnecessary because these countries were suffering from a liquidity problem. They imply that the traditional IMF prescriptions may have done more harm than good as they drove out many highly leveraged but viable firms out of business, thereby deepening the downturn of the economy. While the contribution of initial austerity IMF programs remains still in controversy, it is quite clear that the swift change of macroeconomic policy stance toward an expansionary one helped these economies recover quickly. Fiscal policy had become contractionary immediately after the crisis, but was reversed quickly to be expansionary. Change in monetary policy stance then followed. Once the depreciation of the currency was arrested and stability returned to the foreign exchange market, the authorities of the crisis countries were able to adjust gradually the interest rates downward and expand money supply.

IV.2.2. Panic and Balance Sheet Effect

The contraction of real income in the East Asian countries that suffered the crisis that erupted in 1997 was much larger and the subsequent recovery of these countries has been much faster than what can be predicted from the previous episodes of crisis elsewhere. There must be additional factors that have contributed to the deeper crisis and the quicker recovery in East Asia. We consider that the East Asian crisis has a feature of a severe liquidity crisis caused by investor's panic. This nature of the crisis must have an important role in the macroeconomic adjustment during the crisis.

Markets' Perceptions of the Crisis

One critical factor that could explain both the initial sharper contraction and faster recovery is related to changes in the expectations of foreign investors and both domestic households and firms on economic prospects of the crisis countries. When

foreign investors began to lose confidence in East Asian economies, capital flows abruptly reversed. It is no wonder that this large-scale shift in financial inflows provoked deep contractions, huge depreciation and financial embarrassment. And the argument goes that once investors' panic calms down and foreign capital resumes to inflow the economy rebounds to its long-term trend.

Immediately after the crisis, there was rampant speculation that the crisis countries might not be able to avoid foreign debt default and hence might have to declare a debt moratorium. The international financial community including international financial institutions also did not hesitate to lay the blame on the East Asian countries for the crisis. With the emerging consensus that the crisis countries had profound problems that were more serious than had been realized before, the prospect for recovery in East Asia turned from bad to worse. Many were skeptical whether these countries had institutional capacity and political will to carry out the necessary structural reforms. Even if they had, the skeptics pointed out that these crisis countries would take many years to put their houses in order. Under these circumstances, it is quite possible that the households and firms as well as foreign investors came to believe that the crisis was a permanent shock which would lead to a new equilibrium lower in terms of output and employment than when the crisis was as a temporary shock. And this perception of permanency may have induced domestic consumers and investors to cut down their spending a lot more than otherwise during the first six months of the crisis. However, the extensive criticism of East Asia diminished and gradually gave way to a more optimistic outlook for the crisis economies, and the realization that the crisis might be a temporary phenomenon started sinking in the minds of consumers and investors, thereby encouraging their spending.

In restoring the confidence of foreign investors, large support packages by the IMF made some contributions. The funding helped to reduce the short-term liquidity constraints of the economies and provide resources to stem the exchange rate depreciation. There were other turning points. Korea, for example, reached an

agreement with its creditor in February of 1998 to lengthen the maturities of the short-term foreign currency loans.[7] After the agreement was reached, at least some of foreign credit facilities including trade credit were restored. With this restoration of the credit linkage, the fear of the debt default abated considerably.

Balance Sheet Effects

A large decrease and in aggregate investment demand during the crisis period suggests that corporate distress was one of the main factors responsible for the sharper contraction in output in East Asia. Structural weaknesses in the corporate and bank balance sheets were often pointed out as the main channel through which the effect of foreign disturbances were magnified in the East Asian crisis (Krugman, 1999, and Stone, 2000).

The reversal of capital inflows combined with a sudden downward shift in expectation could lead to a sharp depreciation of the exchange rate. The large unexpected depreciation was much more disastrous in East Asia because most firms were highly-leveraged. When the bulk of corporate debts are denominated in the U.S. dollar while revenues and assets are in local currency, the depreciation deteriorates the balance sheets of firms and incurs large losses.[8] These losses together with the increase in foreign debt financing costs results in a decline in the present value of the equity of the corporate sector. Gray (1999) estimates that a 50% depreciation reduces the equity value of Korean corporations by 9% and that of Indonesian corporations by 21%. The lower equity value leads to lower investment.

The deterioration of the balance sheets of firms is reflected in a massive accumulation of non-performing loans at banks and other non-bank financial institutions. The accumulation of bad loans cuts into profits and consequently a decrease

[7] They did not do so voluntarily, but at the urging of the G-7 governments and the IMF and only when they were convinced that they would be repaid with handsome returns.
[8] According to Hahm and Mishkin (2000), the foreign liabilities accounted for about 16% in total

in the equity value of the financial institutions. Decapitalized financial institutions as a result of the mounting losses are forced to curtail their lending to both viable and non-viable firms, thereby exacerbating the downturn of investment. Since in East Asia banks had a large amount of foreign liabilities in their balance sheets, which were mostly short-term, they also suffered huge losses emanating from the currency mismatch.[9]

Once banks and other non-bank financial institutions suffer a sharp decline in their profits and hence a substantial erosion of their capital base, they are downgraded by the rating agencies and often denied access to international financial markets. As experienced by many money losing financial institutions in East Asia, foreign banks and other institutional investors simply cut the lines of credit they offers through the inter-bank loan market and refused the rollover of short-term loans when their client institutions are in trouble. This refusal created a serious liquidity as well as balance sheet loss problems at the East Asian financial institutions. Faced with the liquidity problem, many banks and non-bank financial institutions had to reduce their supply of loans in both local and foreign currencies drastically even to their viable loan customers. In a bank oriented financial system that characterizes the financial structure of the crisis-hit countries in East Asia, the repercussion of the bank failure is much more pervasive and felt throughout the economy. Because of their dominance, therefore banks are likely to bring down many viable firms than otherwise when they are not able to function as intermediary.

The mounting losses caused by the bank balance sheets deterioration is bound to increase the country risk premium of the crisis-hit countries. A rise in the country risk premium in turn pushes up the cost of capital and lowers the present value of the equity of the corporate sector. Gray (2000) estimates a 8% temporary rise in the country risk

---

corporate debt in 1997 in Korea.

[9] In 1997 the foreign liabilities accounted for about 55% of banks' total liabilities in Korea, 27% in Thailand, and 15% in Indonesia (ADB, 2000).

premium for a year leads to a drop of 7% in the present value of corporate equity in Korea and 2% in Indonesia.[10]

An increase in the interest rate and currency depreciation together with others shocks can reduce the equity value of the corporate sector below a threshold that triggers widespread default. The risk of default was higher in East Asia where firms were highly leveraged with a large amount of short-term liabilities. The firms with a larger share of short-term debt faced more difficulties in financing and were unable to service their debts: bankruptcies soared, thereby magnifying the crisis.

In the recovery process, macroeconomic stability is crucial role for the normal operation of viable firms. Stabilization of the exchange rate and interest rate improves the equity value of the corporate sector and thus promotes investment. Improved confidence leads to an increase in spending. The restructuring of the corporate sector is necessary in order to reduce the vulnerability of the corporate sector and thus prevent the future crisis. However, in the short run, a quick recovery can not be engineered unless there is resurgence of domestic demand.

IV.3. Structural Reform and Recovery[11]

At the beginning of the crisis, there was widespread belief that the crisis countries' commitment to structural reforms would be critical to the recovery in East Asia. The reforms were expected to help East Asia emerge from the crisis with a more stable, transparent and efficient financial and corporate sectors. This expectation of reform espousing a market-oriented system would then improve long-term growth prospects and, at the same time, restore market confidence, thereby inducing the return of foreign lenders and investors to the region.

[10] The high domestic interest rate, which aims at stemming rapid depreciation, has the same devastating effect on the value of corporate sector equity and thus investment.
[11] See Park (2000, 2001) for more details.

Three years into the reform process, the crisis countries have accomplished a great deal in improving the soundness and profitability of financial institutions and alleviating corporate distress. The World Bank (2000) argues that "assertive structural adjustment helped restore credit flows and boosted consumer and investor confidence" (P.7). Yet, it is not clear whether and to what extent financial and corporate restructuring has contributed to the ongoing recovery. Most of the serious structural problems that were identified as the major causes of the crisis in Indonesia, Korea, Malaysia, and Thailand could not have been resolved over a span of two years. In fact, banks are still holding in their balance sheets a large volume of non-performing loans and remain undercapitalized in all four countries. Many corporations in the region are still unable to service their debts. As for institutional reform, new banking and accounting standards, disclosure requirements, and rules for corporate governance have been introduced, but they are not rigorously enforced. It will take many years for the new system to take root.

Since the crisis countries are not even half-way there in restructuring their financial institutions and corporations, it would be presumptuous to argue that the reform efforts have established a foundation for sustainable growth in East Asia. Nor, would it be correct to assert that the gain in efficiency through the restructuring, which is difficult to measure at this stage, has been one of the principal factors driving the recovery. The improvement in efficiency is likely to be realized and translated into high growth over a longer period of time, certainly longer than two years.

The available pieces of evidence also do not support the contention that the market-oriented reform has contributed to restoring market confidence in the East Asian crisis countries; it certainly did not appear to have during the first two years of the crisis. International credit rating agencies report that the reforms in the banking sector in the crisis countries have not gone through enough to ensure that these economies would be able to forestall another financial crisis. Only toward the end of 1999, Moody's and S&P upgraded the sovereign credit ratings of Korea and Malaysia to the lowest

investment grade from the speculation grade. By that time, the recovery was in full swing in East Asia. Journalistic accounts have been abound with similar concerns and continued to raise doubts to the effectiveness of the reform in the crisis countries. Under these circumstances, most foreign investors would find it too risky to return to the crisis countries, but they have. Many of the foreign investors appear to have been lured back by the rapid recovery and substantial improvements in external liquidity resulting from large surpluses on the current account.

Reflecting recovery rather than ratings improvement, capital inflows in East Asia have been rising. Since policy changes and structural reforms are subject to many uncertainties and require a long period of time to take effect, international banks and global institutional lenders do not seem to have either the patience or ability to monitor and assess the effects of structural reforms. This is particularly true when they are preoccupied with the short-term performance of their portfolios.

V. Prospects for Long-term Growth in East Asia

As the recovery continues in East Asia, there is a growing hope that these economies will be able to return to the pre-crisis level of robust growth. In this section, we make an assessment of the past crisis long-term growth prospects for East Asia.

V.1. Impacts of a Currency Crisis on Long-Term Growth

In this section we investigate the impact of a currency crisis on long run growth based on a cross-country regression framework. We control all important growth determinants and then examine whether a currency crisis has had any independent impact on GDP growth in the long-run.

A wide variety of external environment and policy variables will affect growth prospects by changing the long-run potential income and the rate of productivity growth.

Based on the results from previous empirical research, we consider the following variables as the important determinants of long-run per capita income growth: (1) initial income, (2) human resources, (3) investment rate, (4) exogenous shock (terms of trade changes), and (4) institutions and policy variables (government consumption, rule of law, and openness).[12] For the measure of human capital stock, we use the average years of secondary and higher schooling for population aged 15 and over, available from Barro and Lee (2000). The rule of law index is a measure for the quality of institution, which is based on the evaluation by international consulting firms that give advice to international investors. The openness measure is based on Sachs and Warner (1995). This index is calculated as the fraction of years during the period that the country was considered to be open to trade and thus sufficiently integrated with the global economy. The evaluation of the country's openness is made on the basis of four dimensions of trade policy: average tariff rates, quotas and licensing, export taxes, and black market exchange rate premium.

Table 6 presents the results of regression for per capita real GDP growth rate using the explanatory variables just described. The data is a panel set of cross-country data over the two decades, 1975-85 and 1985-95. The system of two equations is estimated by a seemingly-unrelated-regression (SUR) technique, which allows for the correlation of the errors across the equations.

The regressions show that most of the controlling variables are the significant determinants of long-term growth. For instance, the coefficient on the log value of initial GDP is highly significant. Thus it provides strong evidence for conditional convergence: that is, a poor country with a lower initial income level grows faster, when the variables influencing the steady-state level of income are controlled. Specifically, the coefficient in column 1 of Table 6, implies that a country at the half of income level of another country grows by 1.4 percentage points (=2.0%*ln(2)) faster than the richer country.

[12] Our specification closely follows Barro (1997) in selecting the explanatory variables.

*Insert <Table 6>

We add to the regression a variable that measures the occurrence of currency crises. The variable is constructed with the number of currency crises that each country experienced during the past decade. We have used the number of crises over the period of 1970-75 for the first equation and over the period of 1975-85 for the second equation. Thus we test if an experience of a currency crisis can have an impact on growth in the next decade. The estimated coefficient turns out to be statistically insignificant, implying that there is no direct impact of currency crises on growth in the long-run. In the column (2) of the regression, we add another variable that represents the number of currency crises with the IMF program participation. We also found no significance for this variable.

Although there is no direct impact of a currency crisis on long-run growth, it would be possible that a currency crisis or IMF program can have an indirect impact on long-run growth by influencing the controlling variables. For instance, if the investment ratio becomes permanently lower by the post-crisis stabilization program in the crisis-hit countries, it would have a negative impact on growth in the long-run. On the contrary, if the IMF structural reform improves the quality of institutions, then a currency crisis with the IMF program participation can have a positive impact on growth.

V.2. Sustainability of East Asian Growth

The quick turnaround of the Asian economy from the 1997 crisis has brightened the region's economic prospects. Despite the impressive record of the recovery, however, not everyone is sanguine about East Asia's future prospects. The World Bank and IMF, for example, are not optimistic about the prospects of these

countries sustaining the ongoing recovery, largely because weaknesses of financial institutions and balance sheet problems of corporations still remain unresolved in the region.

The macroeconomic performance of the crisis countries in 2001 will provide important clues to the question of whether these countries will be able to return to the pre-crisis trend rate of growth. Up to 2000, pattern of recovery in East Asia has been quite similar to that of Mexico after its crisis in 1994.

Although the financial crisis of 1997 abruptly brought a halt to Asia's period of robust growth, there was little in Asia's fundamentals that inevitably led to the crisis. The key to the Asian crisis was too much short-term capital flowing into weak and under-supervised financial systems. This suggests that with better financial management and a return to the core policies that resulted in rapid growth, the East Asian economies can again return to sustained growth (Radelet, Sachs and Lee, 2001). The major factors that have brought the relatively high growth in East Asia were high rates of saving, good human resources, trade openness, and maintenance of good institutions. In terms of these fundamentals, East Asia still keeps strong potential for a sustained growth.

But, in the long-term, the growth rate will be lower than the previous pre-crisis average of 7%. The convergence factor, which was found to be quite strong in the cross-country growth regression in the last section, implies that the faster growth in the last decades for itself will force the East Asian economies to grow at a slower pace in the next decade. That is, the East Asian countries now have a much smaller gap in reproducible (physical and human) capital and technical efficiency from their long-run potential levels than they had in the last decades. Hence, the East Asian economies will face a smaller chance for rapid "catching up," via high rates of capital accumulation as well as the diffusion of technology from more technically advanced economies in the next decade, and inevitably become adjusted to a lower growth path.

The coefficient in the cross-country growth regressions implies that the convergence factors alone makes the Asian economies grow by about 1.5 percentage

points slower over the next decade, compared to the last decades in which they had started with less than a half of the current income. Hence, unless the economies could achieve substantial improvements in other fundamental factors, such as quality of institutional quality, they would grow at the range of 5% per year in GDP.

V. Concluding Remarks

The contraction of real income in the East Asian countries that suffered the crisis that erupted in 1997 was much larger and the subsequent recovery of these countries has been much faster than what can be predicted from the previous episodes of crisis elsewhere. The purpose of this paper has been to identify some of the factors that may explain the severity of and rapid recovery from the crisis. According to the empirical examination of macroeconomic developments following the crisis in East Asia, which show a V-type adjustment of real GDP growth, a large real depreciation, expansionary monetary and fiscal policy, and an improvement in the global economic environment have been responsible for the upturn of the crisis-hit countries. In this sense, the East Asian process of adjustment is not much different from the stylized pattern from the previous 160 currency crisis episodes over the period from 1970 to 1995. However, the stylized pattern of adjustment cannot explain why the crisis was severe and the recovery has been much faster than what was expected from the previous experiences of crisis. This study argues that the East Asian financial upheaval was in a large measure a liquidity crisis caused by investor's panic. Once the liquidity constraint was eased as it was during the first half of 1998, domestic demand has since surged again and the crisis countries have been able to move toward the pre-crisis path of growth.

Reference

Asia Development Bank, *Asian Recovery Report 2000*, March 2000.

Barro, R. (1997), *Determinants of Economic Growth: A Cross-country Empirical Study*, Cambridge MA, MIT Press.

Barro, R. and J. Lee, (2000), "International Data on Educational Attainment: Updates and Implications," working paper, Center for International Development at Harvard University, forthcoming *Oxford Economic Papers*.

Conway, Patrick (1994),"IMF Lending Programs: Participation and Impact," *Journal of Development Economics*, 45, 365-391.

Feldstein, Martin (1998), "Refocusing the IMF," *Foreign Affairs*, Vol. 77, pp. 20-33.

Frankel, Jeffrey A. and Andrew K. Rose (1996), "Currency Crashes in Emerging Markets: An Empirical Treatment," *Journal of International Economics*, 41, 351-366.

Gray, Dale, (1999), "Assessment of Corporate Sector Value and Vulnerability: Links to Exchange Rate and Financial Crises," World Bank Technical Paper No. 455.

Gupta, Poonam, Deepak Mishra and Ratna Sahay (2000), "Output Response During Currency Crises,"Draft, IMF and World bank.

Haque, Nadeem Ul and Mohsin S. Kahn (1998), "Do IMF-Supported Programs Work? A Survey of the Cross-Country Empirical Evidence," IMF Working Paper, WP/98/169.

Hahm, Joon-Ho, and Frederic Mishkin (2000), "Causes of the Korean Financial Crisis: Lessons for Policy," NBER working paper 7483.

Hong, Kiseok, and Aaron Tornell (1999), "Post-Crisis Development of Asia," mimeo, Korea Development Institute.

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

Krugman, Paul (1999), "Balance Sheets, the Transfer Problem and Financial Criese," in *International Finance and Financial Crises*, edited by P. Isard, A. Razin, and A. Rose, Kluwer Academic Publishers.

Milesi-Ferreti, Gian Maria and Assaf Razin (1998), "Current Account Reversal and Currency Cries: Empirical Regularities," IMF Working Paper, WP/98/89.

Lee, J.W. and C. Rhee (2000), "Macroeconomic Impacts of the Korean Financial Crisis: Companion with the Cross-country Patterns", mimeo., The Center for International Development at Harvard University.

Lee, J.W., K. Hong, and C. Rhee (2001),"The Macroeconomic Adjustment during the Currency Crises," mimeo., in Korean.

Park,Y.C.(2000), "East Asian Dilemma: Restructuring Out or Growing out?," *Princeton Essay in International Economics*, forthcoming.

Park, Y.C. (2001), "A Post Crisis Paradigm of Development for East Asia: Governance, Markets, and Institutions", mimeo., Korea University.

Przeworski, Adam, James R. Vreeland (2000),"The Effect of IMF Programs on Economic Growth," *Journal of Development Economics*, 62, 385-421.

Radelet, S. and J. Sachs (1998), "The East Asian Financial Crisis: Diagnosis, Remedies, Prospects," *Brookings Papers on Economic Activity I*.

Radelet, S. J. Sachs, and Lee, J.W. (2001), "The Determinants and Prospects of Economic Growth in Asia," forthcoming *International Economic Journal*.

Sachs, J. D., A. Tornell, and A. Velasco (1996), "The Collapse of the Mexican Peso: What Have We Learned?" *Economic Policy*.

Sachs, J. and A. Warner (1995), "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity* 1(August): 1-118.

Stone, Mark (2000), "The Corporate Sector Dynamics of Systemic Financial Crises," WP/00/114, IMF Working Paper.

World Bank (2000), *East Asia: Recovery and Beyond*, May.

Table 1. Incidence of Currency Crises and IMF Program Participation, Over the Period, 1970-1997

Period	Currency Crises		
	Total No.	IMF Program Participation	
		Yes	*No*
1970-1995	160	53	107
1970-1979	33	11	22
1980-1989	55	14	41
1990-1997	72	22	38

Note: A currency crisis is defined to occur in the year when a country has a nominal depreciation of currency of at least 25 percent in any quarter of a year and the depreciation rate exceeds the previous quarter' s change in the exchange rate by a margin of at least a 10 percent. If the country under a currency crisis received a financial assistance from the IMF during the year or one year after the currency crisis, it is classified as a case of a currency crisis with the IMF program participation. Our sample does not include the former Soviet Union countries and counts only independent crises by imposing plus/minus 2 years window.

Table 2: Determinants of the Pace of Recovery from the Currency Crises

A sample of 95 crisis episodes between 1970 and 1995

	Dependent variable Average GDP growth rate from t+1 to t+k				
(t+k=)	*t+1*	*t+2*	*t+3*	*t+4*	*t+5*
Real GDP per capita at t	-2.003*	-1.213*	-1.038*	-0.827*	-0.848*
(ppp-adjusted, log)	(0.554)	(0.383)	(0.325)	(0.285)	(0.262)
Pre-crisis GDP growth	-0.124	-0.037	0.061	0.079	0.103
(Average, t-3 to t-5)	(0.140)	(0.098)	(0.083)	(0.072)	(0.067)
World per capita GDP growth	0.452**	0.162	0.356*	0.118*	0.096*
(Average, t+1 to t+k)	(0.242)	(0.189)	(0.165)	(0.029)	(0.027)
Investment ratio	0.129*	0.136*	0.117*	0.118*	0.096*
(Average, t+1 to t+k)	(0.053)	(0.037)	(0.033)	(0.029)	(0.027)
Real exchange rate change*trade share	0.032	0.008	-0.031	-0.064*	-0.089*
(Average, t to t+k-1)	(0.025)	(0.022)	(0.021)	(0.025)	(0.030)
Public consumption growth	0.0495	0.058*	0.071*	0.081*	0.093*
(Average, t to t+k)	(0.033)	(0.026)	(0.022)	(0.019)	(0.024)
Real money supply growth	0.010	0.058	0.022**	0.013	0.001
(Average, t to t+k)	(0.026)	(0.026)	(0.012)	(0.011)	(0.011)
IMF program participation	-0.143	0.552	0.686	0.533	0.004
(dummy)	(1.099)	(0.762)	(0.640)	(0.557)	(0.511)
No. of crisis episodes	95	95	95	95	95
R square	0.14	0.19	0.27	0.33	0.33

Notes: Standard errors reported in parentheses. Levels of statistical significance indicated by asterisks; *95 percent; ** 90 percent. The system has 5 equations, where the dependent variables are the average real GDP growth rates over k years from the crisis year, t. The system is estimated by the seemingly unrelated regression (SUR) technique, which allows for different error variances in each equation and for correlation of these errors across equations. Each equation has a different constant term, which is not reported. An increase in real exchange rate indicates a real appreciation.

Table 3: Determinants of the Growth Reversal Between Pre-Crisis And Post-Crisis Period

	Dependent variable Average GDP growth rate from t+1 to t+k minus average growth rate in t-1 and the crisis year				
(t+k=)	*t+1*	*t+2*	*t+3*	*t+4*	*t+5*
Real GDP per capita at t	-2.235*	-1.446*	-1.259*	-1.014*	-1.017*
(ppp-adjusted, log)	(0.723)	(0.577)	(0.528)	(0.508)	(0.489)
Pre-crisis GDP growth	-0.174	-0.072	0.031	0.041	0.065
(Average, t-3 to t-5)	(0.182)	(0.146)	(0.133)	(0.127)	(0.123)
World per capita GDP growth	0.413**	0.080	0.257	0.339**	0.350
(Average, t+1 to t+k)	(0.245)	(0.195)	(0.178)	(0.202)	(0.249)
Investment ratio	0.089	0.090**	0.066	0.071**	0.050
(Average, t+1 to t+k)	(0.061)	(0.048)	(0.045)	(0.043)	(0.043)
Real exchange rate change*trade share	0.033	0.011	-0.026	-0.061*	-0.089*
(Average, t to t+k-1)	(0.025)	(0.022)	(0.022)	(0.028)	(0.035)
Public consumption growth	0.049	0.049**	0.055**	0.059*	0.055*
(Average, t to t+k)	(0033)	(0.026)	(0.021)	(0.021)	(0.027)
Real money supply growth	0.008	0.011	0.011	-0.004	-0.020
(Average, t to t+k)	(0.026)	(0.017)	(0.012)	(0.012)	(0.012)
IMF program participation	0.389	1.053	1.192	1.055	0.533
(dummy)	(1.423)	(1.133)	(1.033)	(0.989)	(0.559)
No. of crisis episodes	95	95	95	95	95
R square	0.04	0.03	0.01	-0.05	0.01

Note: See Table 2

Table 4: Regressions for Investment Rate in the Post-Crisis Period

	Dependent variable Average Investment Ratio from t+1 to t+k		
(t+k=)	*t+1*	*t+2*	*t+3*
GDP growth in the crisis-year	0.421*	0.367*	0.384*
	(0.118)	(0.123)	(0.103)
Real exchange rate change	-0.039	-0.021	0.014
(Average, t to t+k-1)	(0.033)	(0.045)	(0.044)
Public investment-GDP ratio	1.449*	1.382*	1.243*
(Average, t to t+k)	(0.136)	(0.100)	(0.094)
Real money supply growth	0.089*	0.138*	0.166*
(Average, t to t+k)	(0.035)	(0.042)	(0.040)
IMF program participation	0.696	1.426	1.353
(dummy)	(0.998)	(1.042)	(1.033)
No. of crisis episodes	75	75	75
R square	0.75	0.73	0.75

Note: Each equation is estimated by the least squares method. Robust standard errors reported in parentheses. Levels of statistical significance indicated by asterisks; *95 percent; ** 90 percent. Constant term is included, but not reported.

Table 5. Macroeconomic Adjustment in East Asia, 1993-2000*(2000 to be added)

a. Indonesia

	1993	1994	1995	1996	1997	1998	1999
GDP growth rate(%)	7.25	7.54	8.22	7.82	4.70	-13.20	0.23
Expenditure on GDP							
Private Consumption Growth rate	11.77	7.83	12.58	9.72	7.82	-3.32	1.48
(share in GDP, %)	58.5	58.7	61.0	62.1	64.0	71.2	72.1
Government Consumption Growth rate	0.19	2.31	1.34	2.69	0.06	-15.37	0.69
(share in GDP, %)	9.0	8.6	8.0	7.7	7.3	7.1	7.2
Gross Domestic Investment growth rate	4.88	10.83	11.01	11.97	6.89	-31.81	-15.85
(share in GDP, %)	29.5	32.0	33.4	32.5	33.0	21.0	17.2
Exports of goods and services Growth rate	6.81	9.94	7.72	7.56	7.80	11.18	-32.06
(share in GDP, %)	26.8	27.4	27.2	27.2	28.0	35.8	24.3
Imports of goods and services Growth rate	4.65	20.30	20.94	6.86	14.72	-5.29	-40.90
(share in GDP, %)	23.8	26.6	29.7	29.5	32.3	35.2	20.8
Policy Indicators							
Government Capital Expenditure as % of Inv.	27.0	23.3	19.7	17.8	14.8	24.1	--
Growth Rate of Real M2	10.5	11.5	17.8	19.2	19.0	5.0	-8.0
Annual Real Bank Credit Growth Rate	13.9	12.2	12.5	14.5	17.2	-25.0	-56.5
Real Effective Exchange Rate	--	--	100	109.5	104.5	52.7	74.5

b. Korea

	1993	1994	1995	1996	1997	1998	1999
GDP growth rate(%)	5.49	8.25	8.92	6.75	5.01	-6.69	10.66
Expenditure on GDP							
Private Consumption Growth rate	5.60	8.19	9.60	7.07	3.50	-11.43	10.32
(share in GDP, %)	54.4	54.4	54.7	54.9	54.1	51.3	51.2
Public Consumption Growth rate	4.58	1.90	0.81	8.17	1.45	-0.41	-0.60
(share in GDP, %)	11.1	10.4	9.7	9.8	9.5	10.1	9.1
Gross Domestic Investment growth rate	5.87	8.55	9.37	7.50	-1.44	-16.68	2.90
(share in GDP, %)	34.4	36.4	37.2	37.9	33.4	22.0	26.0
Exports of goods and services Growth rate	11.30	16.08	24.59	11.21	21.44	13.25	16.35
(share in GDP, %)	24.6	26.4	30.2	31.5	36.4	44.2	46.4
Imports of goods and services Growth rate	6.21	21.58	22.36	14.25	3.18	-22.40	28.94
(share in GDP, %)	25.1	28.2	31.7	33.9	33.3	27.7	32.3
Policy Indicators							
Government Capital Expenditure as % of Inv.	6.0	6.7	8.6	10.0	11.0	21.6	18.8
Growth Rate of Real M2	11.8	12.4	11.2	10.9	9.7	19.5	26.6
Annual Real Bank Credit Growth Rate	6.8	13.7	10.3	14.4	14.4	4.3	18.8
Real Effective Exchange Rate	--	--	100	104.5	100.3	83.1	90.8

c. Malaysia

	1993	1994	1995	1996	1997	1998	1999
GDP growth rate(%)	9.89	9.21	9.83	10.00	7.54	-7.50	5.42
Expenditure on GDP							
Private Consumption Growth rate	6.25	9.39	11.66	6.87	4.31	-10.80	2.53
(share in GDP, %)	48.3	48.4	49.2	47.8	46.4	44.7	43.5
Government Consumption Growth rate	8.43	7.87	6.06	0.73	7.63	-7.84	20.08
(share in GDP, %)	13.0	12.9	12.4	11.4	11.4	11.3	12.9
Gross Domestic Investment growth rate	15.41	14.14	19.04	6.71	8.87	-36.29	0.54
(share in GDP, %)	41.7	44.9	49.2	47.3	48.9	30.2	26.9
Exports of goods and services Growth rate	11.54	21.91	18.96	9.23	5.42	-0.21	13.76
(share in GDP, %)	80.3	89.7	97.1	96.5	94.6	102.0	110.1
Imports of goods and services Growth rate	15.04	25.64	23.7-	4.89	5.74	-19.37	11.58
(share in GDP, %)	83.3	95.9	108.0	102.9	101.2	88.2	93.4
Policy Indicators							
Government Capital Expenditure as % of Inv.	13.5	12.4	12.9	12.0	11.9	23.8	--
Growth Rate of Real M2	23.0	7.9	16.8	20.8	14.7	-6.7	14.2
Annual Real Bank Credit Growth Rate	7.1	10.2	26.5	16.9	19.9	-2.2	0.5
Real Effective Exchange Rate	--	--	100.0	106.5	105.5	86.8	87.6

d. Philippines

	1993	1994	1995	1996	1997	1998	1999
GDP growth rate(%)	2.13	4.39	4.67	5.85	5.19	-0.59	3.32
Expenditure on GDP							
Private Consumption Growth rate	3.05	3.72	3.82	4.62	4.99	3.45	2.64
(share in GDP, %)	78.8	78.3	77.7	76.8	76.6	79.7	79.2
Government Consumption Growth rate	6.15	6.13	5.62	4.10	4.67	-1.95	5.41
(share in GDP, %)	8.0	8.1	8.2	8.1	8.0	7.9	8.1
Gross Domestic Investment growth rate	8.00	7.14	4.94	9.94	9.77	-9.00	-0.11
(share in GDP, %)	22.7	23.6	23.3	24.8	26.3	22.2	21.1
Exports of goods and services Growth rate	6.26	19.77	12.04	15.40	17.15	-21.04	3.65
(share in GDP, %)	34.9	40.1	42.9	46.8	52.1	41.4	41.5
Imports of goods and services Growth rate	11.48	14.51	16.03	16.73	13.49	-14.71	-2.79
(share in GDP, %)	43.9	48.2	53.4	58.9	63.6	54.5	51.3
Policy Indicators							
Government Capital Expenditure as % of Inv.	15.0	13.7	13.4	8.1	8.0	8.0	--
Growth Rate of Real M2	20.2	16.0	16.2	14.2	20.2	-1.2	9.4
Annual Real Bank Credit Growth Rate	30.7	19.2	31.8	38.8	20.2	-15.4	-6.3
Real Effective Exchange Rate	--	--	100.0	110.4	111.0	94.0	100.8

e. Thailand

	1993	1994	1995	1996	1997	1998	1999
GDP growth rate(%)	8.38	8.95	8.90	5.93	-1.68	-10.17	4.16
Expenditure on GDP							
Private Consumption Growth rate	8.43	7.87	7.55	6.83	-1.05	-12.33	3.49
(share in GDP, %)	55.8	55.2	54.6	55.0	55.4	54.0	53.7
Government Consumption Growth rate	5.11	8.19	5.37	11.91	-3.03	1.94	2.82
(share in GDP, %)	8.3	8.2	7.9	8.4	8.3	9.4	9.3
Gross Domestic Investment growth rate	8.55	10.83	10.04	8.08	-18.59	-35.17	-1.72
(share in GDP, %)	40.9	41.6	42.7	43.0	33.7	19.0	20.5
Exports of goods and services Growth rate	12.74	14.25	15.50	-5.53	8.41	6.72	8.86
(share in GDP, %)	42.4	44.4	47.1	42.0	46.3	55.1	57.5
Imports of goods and services Growth rate	11.78	15.75	19.87	-0.52	-11.38	-22.28	20.24
(share in GDP, %)	44.9	47.7	52.5	49.3	44.4	38.4	44.4
Policy Indicators							
Government Capital Expenditure as % of Inv.	12.9	13.4	12.0	16.6	23.4	29.3	23.1
Growth Rate of Real M2	15.1	7.7	11.3	6.8	10.9	1.6	5.1
Annual Real Bank Credit Growth Rate	18.6	24.6	15.1	9.4	13.6	-11.3	-6.0
Real effective exchange rate	--	--	100.0	109.2	102.4	90.0	93.5

Source: Asian Development Bank on-line country data
(http://www.adb.org/Statistics/country.asp)
Note: The share of expenditure components in GDP is constructed based on data in constant prices.

.

Table 6. Long-Run Impact of Currency Crisis on Per Capita Growth Rate

Independent variable	(1)	(2)
Estimation method	*Seemingly-Unrelated Regression*	
Initial GDP per capita(log)	-1.965 (0.360)	-1.975 (0.365)
Years of schooling	0.350 (0.246)	0.357 (0.247)
Investment rate	0.084 (0.033)	0.085 (0.032)
Terms of trade change (% per annum)	0.084 (0.036)	0.086 (0.037)
Government consumption (Percentage in GDP)	-0.139 (0.032)	-0.140 (0.032)
Rule of law index	1.212 (0.830)	1.195 (0.829)
Openness (1= most open)	2.726 (0.482)	2.708 (0.485)
Currency Crisis (no. of crises in previous decade)	0.043 (0.033)	0.211 (0.436)
Currency Crisis with IMF Program (no. of crises in previous decade)		-0.386 (0.670)
R^2 Number of observations	.54, .37 84, 82	.54, .37 84, 82

Notes: The system has two equations, where the dependent variables are the growth rate of real per capita GDP for each of the two: 1975-85 and 1985-95. The estimations use the SUR (seemingly-unrelated) estimation technique, which allows the error term to be correlated across the two periods and to have a different variance in each period. Each equation is allowed to have a different constant term (not reported). Standard errors are shown in parentheses. The R^2 values and the number of observations apply to each period separately.

Figure 1. Changes in GDP Growth Rates During the Currency Crises

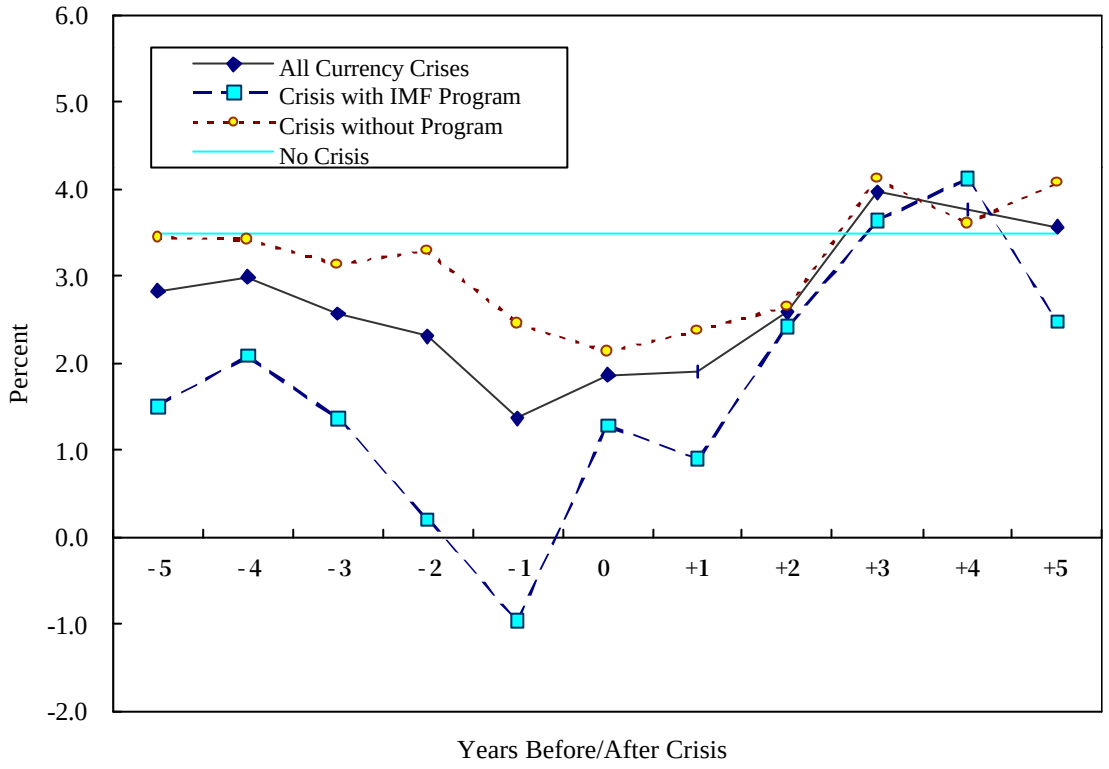
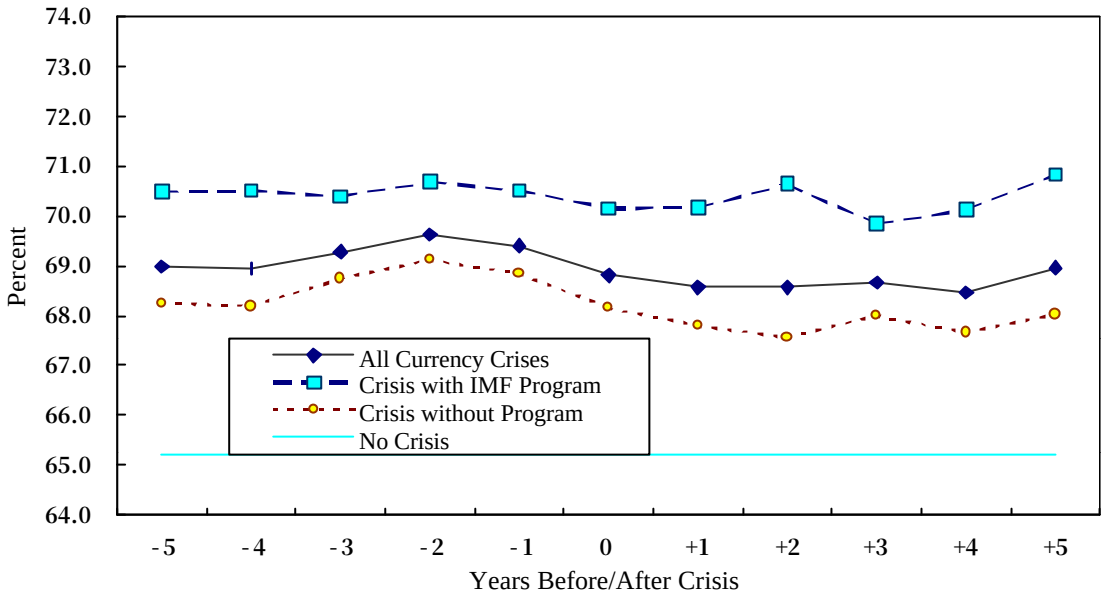
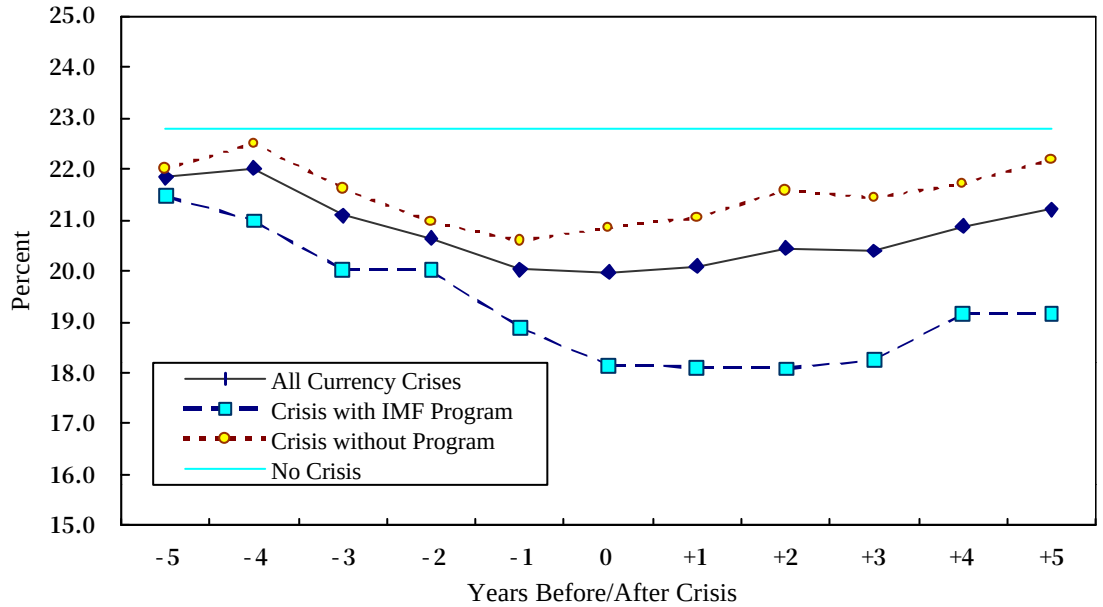


Figure 2. Changes in GDP Expenditure Components During the Currency Crises

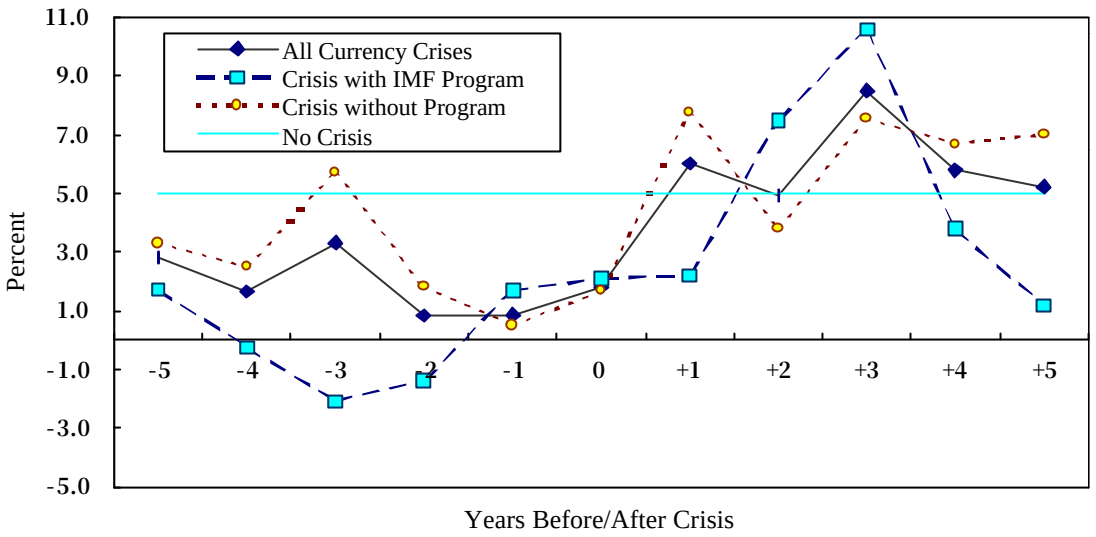
(a) Private Consumption in GDP



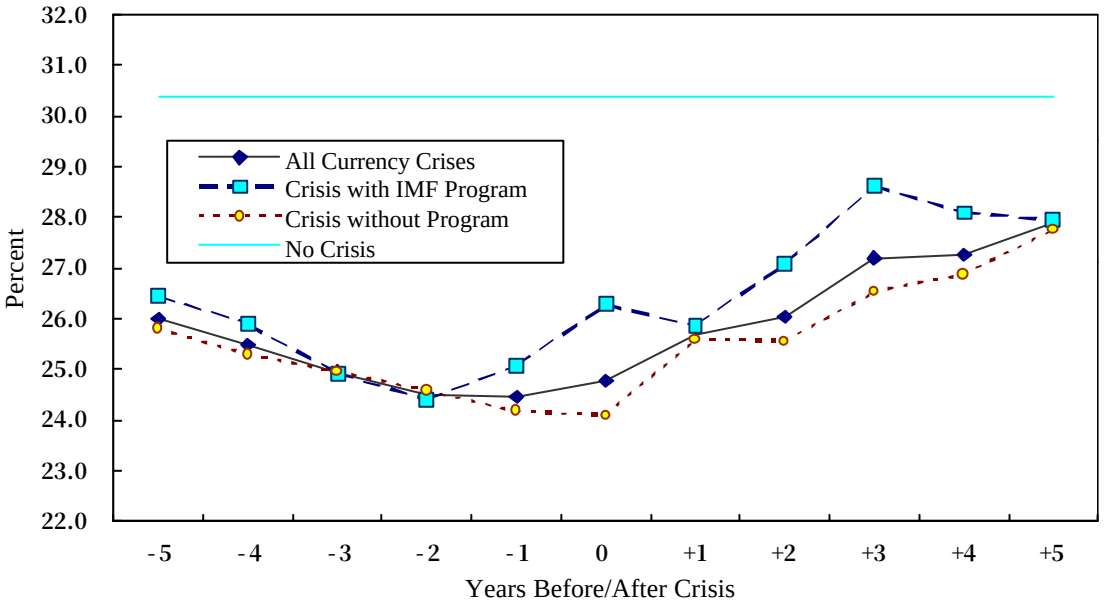
(b) Investment Rate



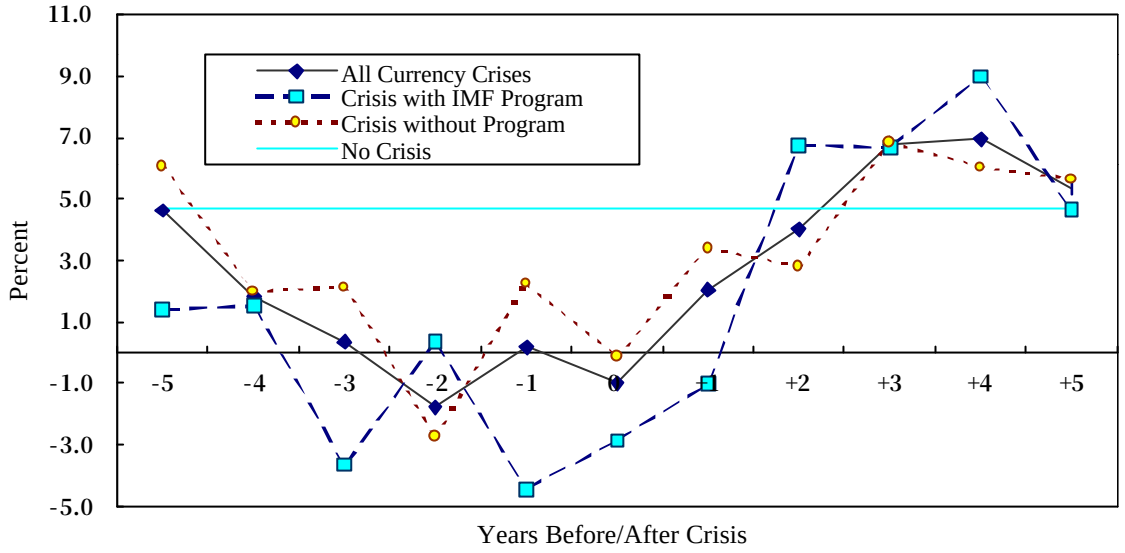
(c) Real Export Growth Rate



(d) Export Share in GDP



(e) Real Import Growth Rate



(f) Import Share in GDP

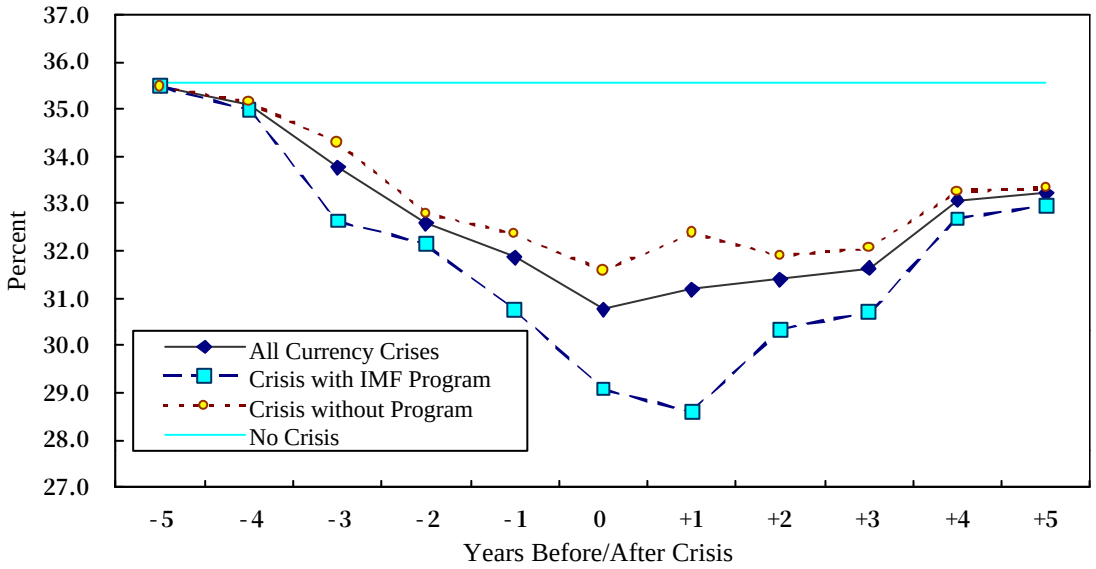
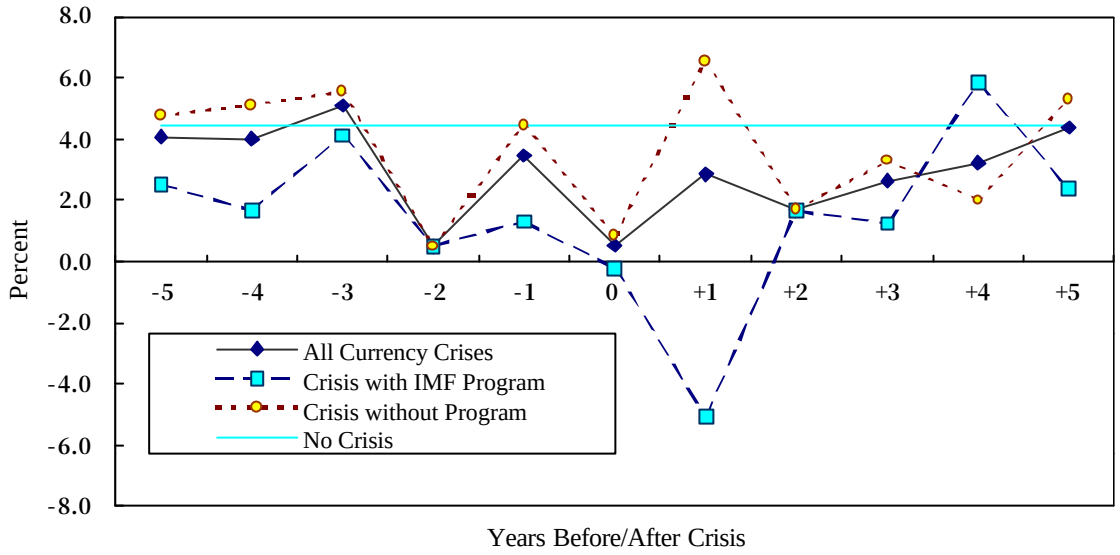
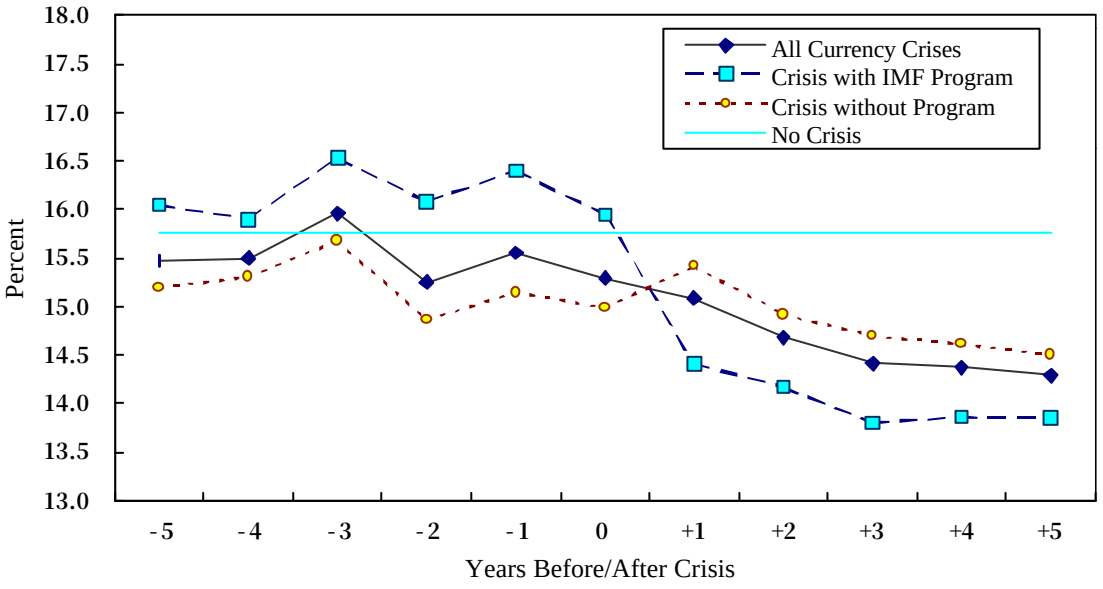


Figure 3. Macroeconomic Policy Indicators During the Currency Crises

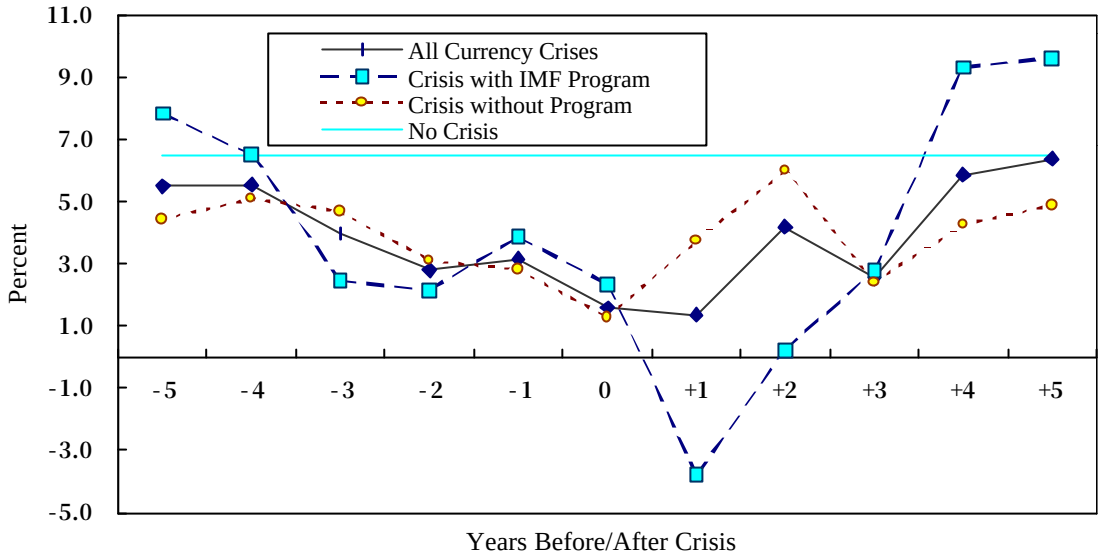
(a) Real Public Consumption Growth Rate



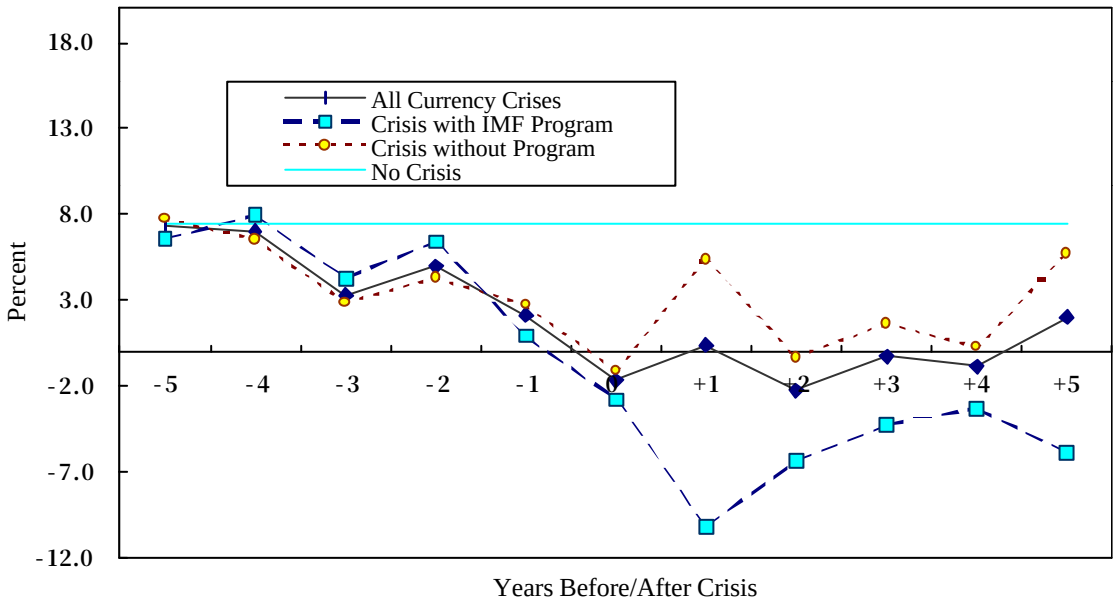
(b) Public Consumption in GDP



(c). Real Money Supply (M2)
Growth Rate



(d). Real Bank Credit
Growth Rate



(e)Change in Real Exchange Rate

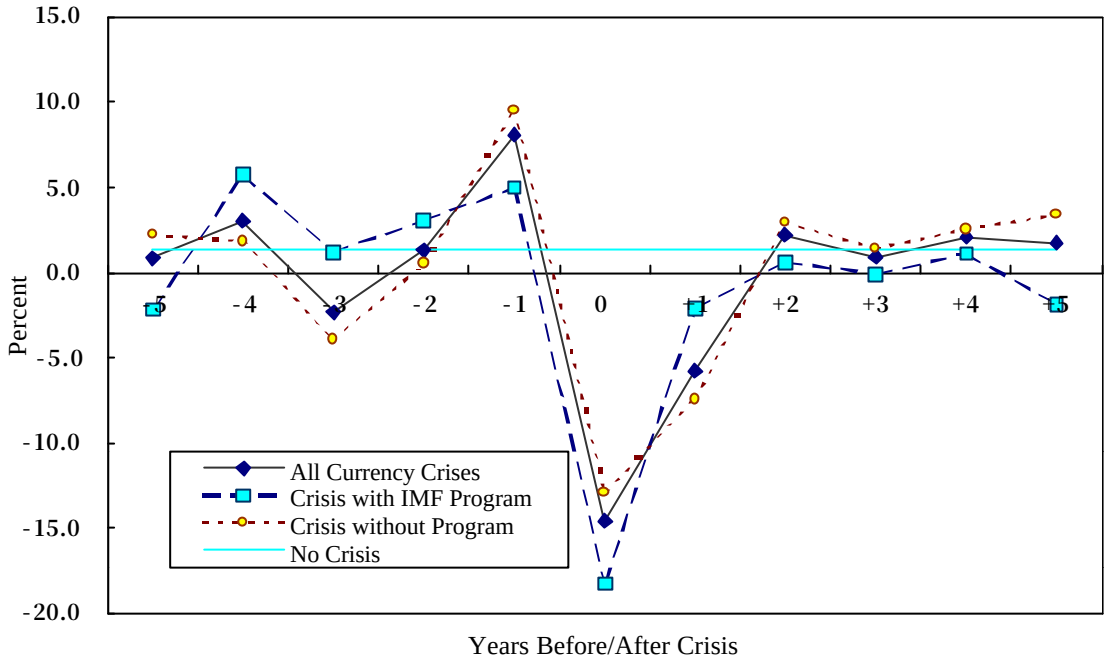
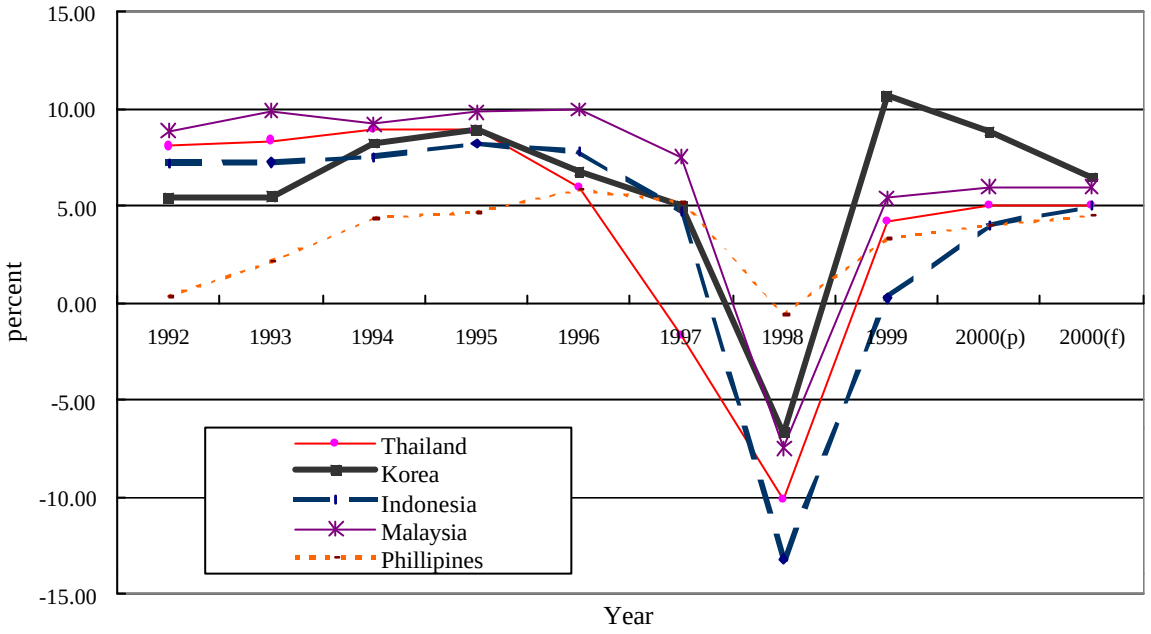


Figure 4. Adjustment of Real GDP Growth in East Asia



Note: 2000(p)- preliminary estimates and 2001(f)- forecasts by the IMF (IMF, World Economic Outlook, September 2000)

Figure 5. Quarterly Changes of Real GDP Growth in East Asia
(y-o-y, %)

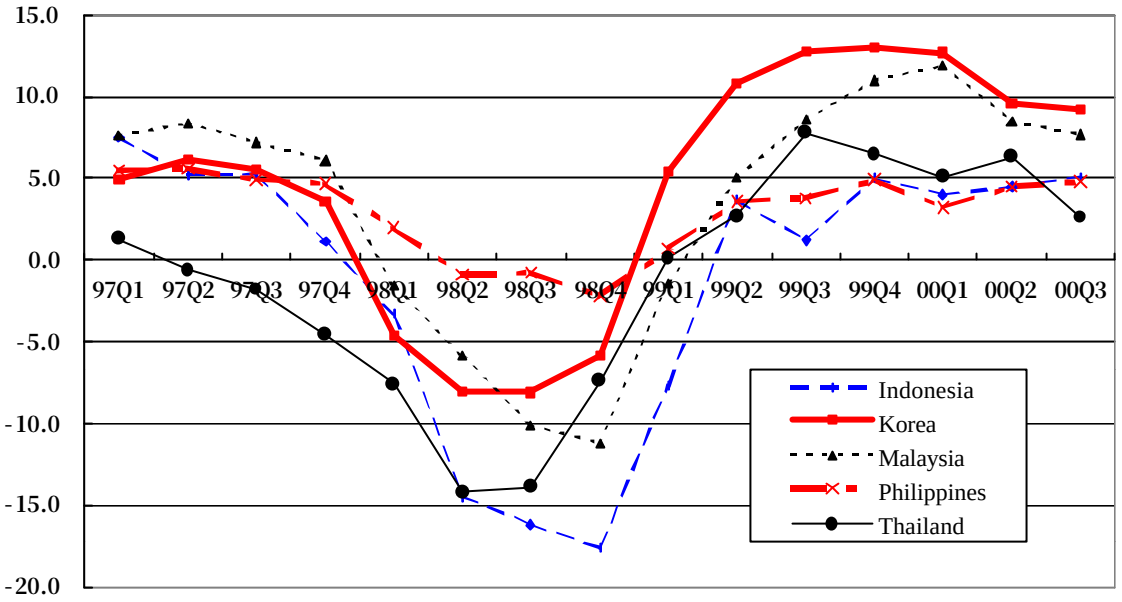
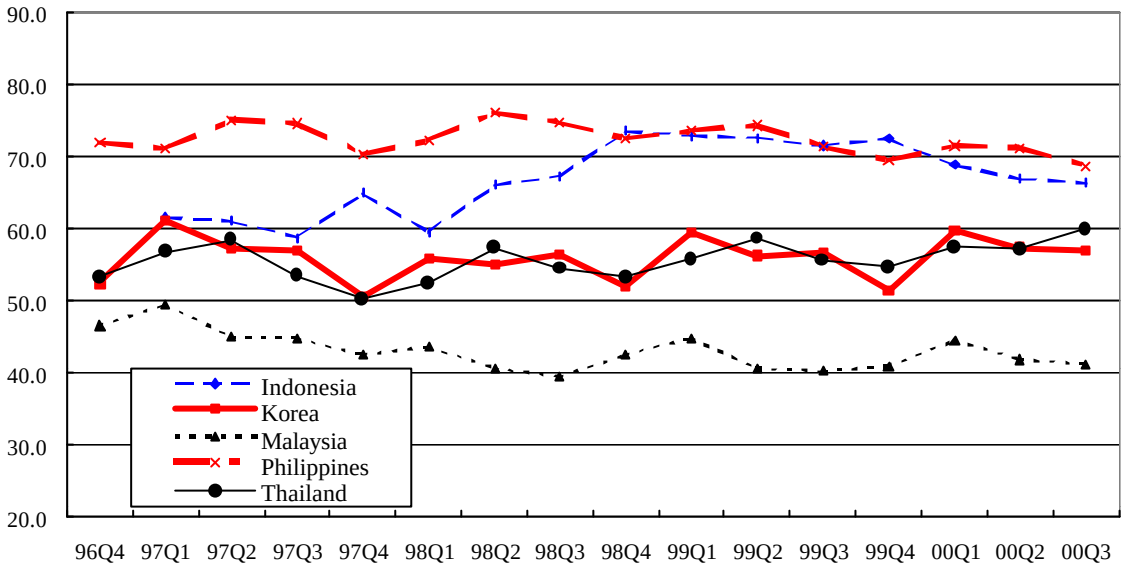
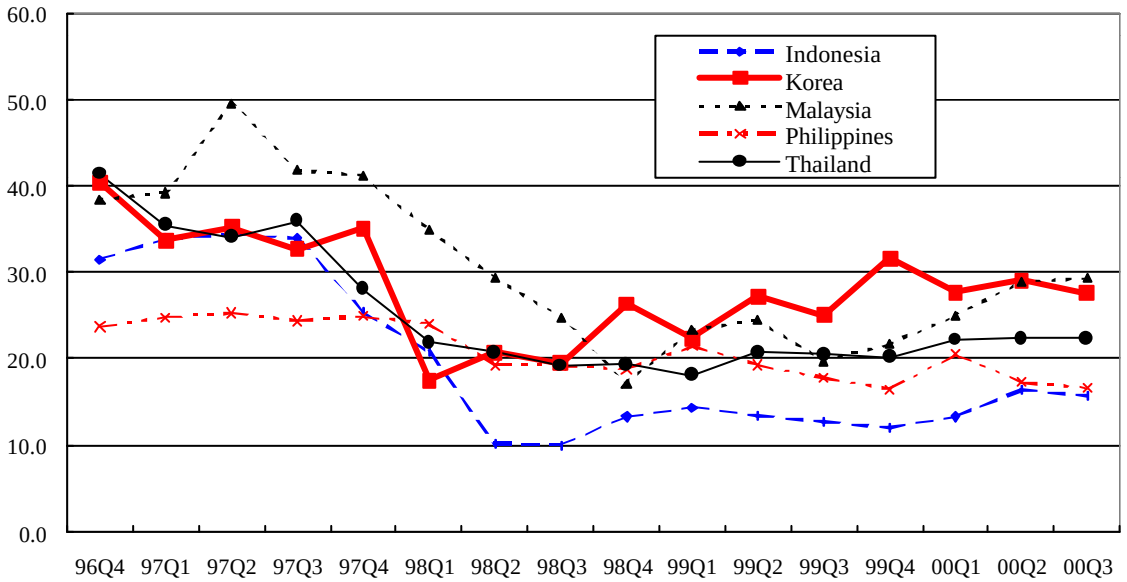


Figure 6. Quarterly Movements of GDP Components in East Asia

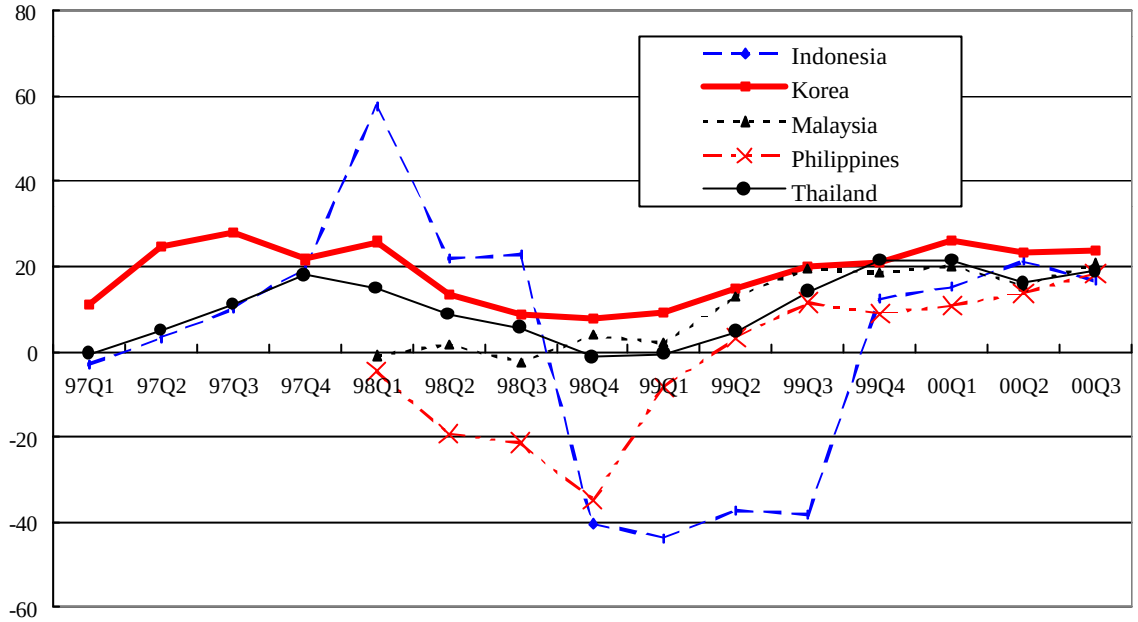
(a) Private consumption in GDP



(b) Investment Rate



c. Real Export Growth Rate



(d) Real Import Growth

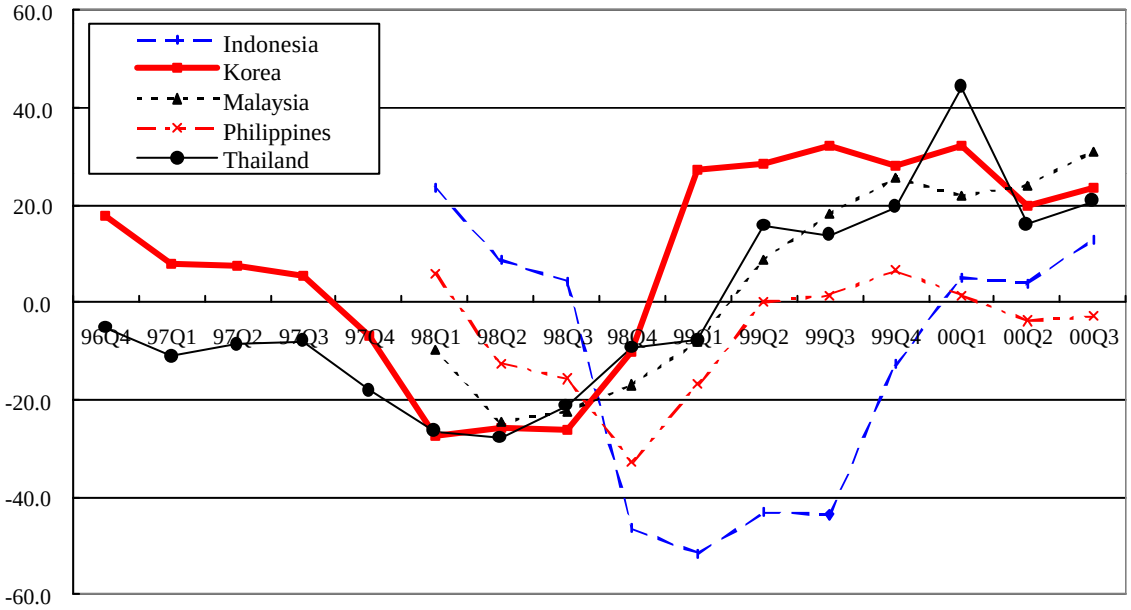
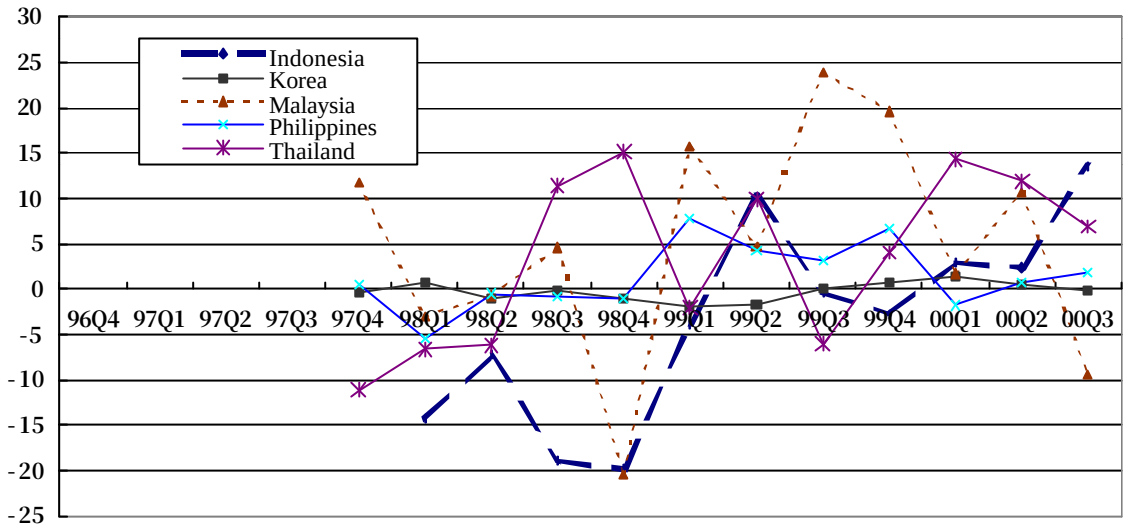
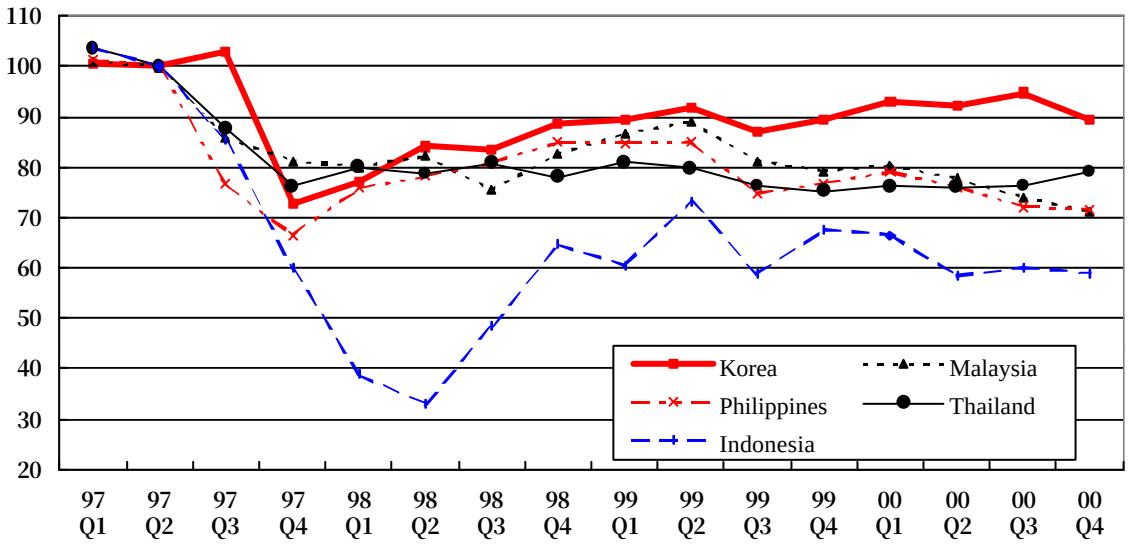


Figure 7. Policy Indicators in East Asia

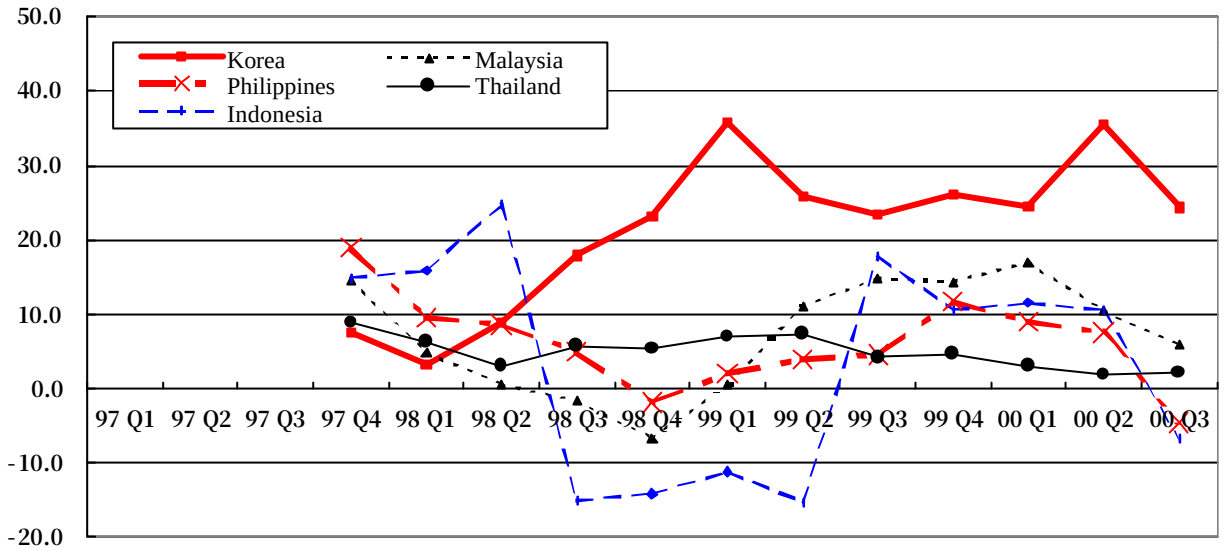
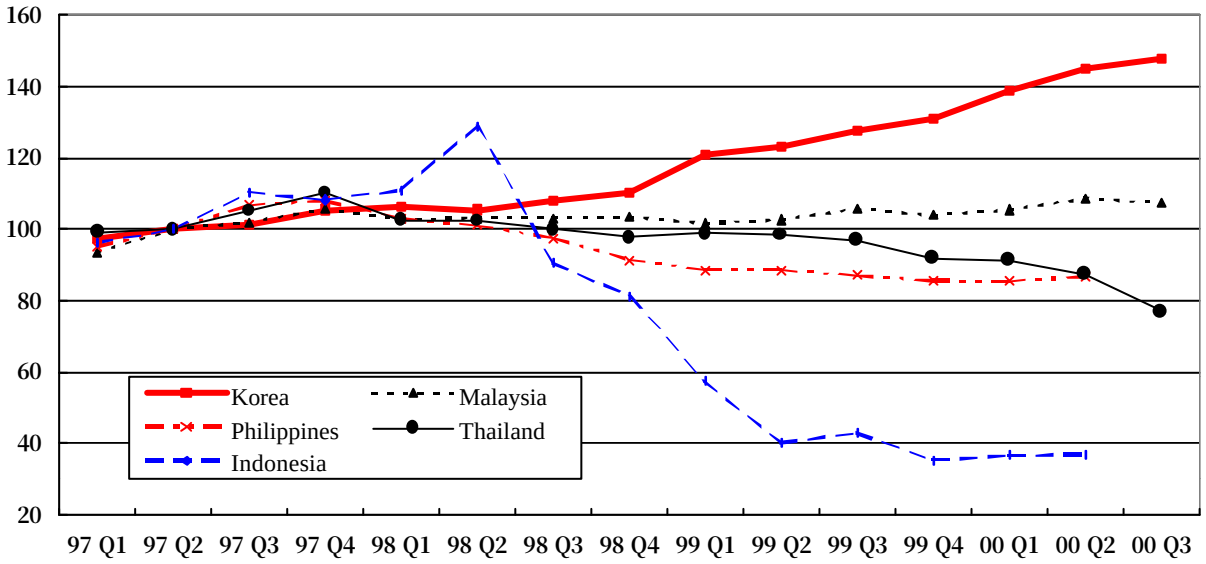
(a) Real Public Consumption Growth



b. Real Effective Exchange Rate (1997Q2=100)



C. Real Money Supply Growth



d. Real Credit (1997,Q2=100)