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CHALLENGES AND CHOICES IN POST-CRISIS EAST-ASIA:

Simulations of Investment Policy Reform in an Intertemporal, Global Model

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ABSTRACT

The East Asian financial crisis exposed the problems of excessive government intervention in credit allocation and poor supervision of the banking system. We argue that the crisis is an opportunity to reformulate the strategies of growth by way of eliminating politicized intervention on investment. In an intertemporal general equilibrium model, we examine the adjustment processes of the crisis-hit region and the world economies, and investigate the removal of the investment subsidies. Our results suggest that the immediate impact of the crisis on the Asian economies is a contraction of GDP and investment. We also find significant welfare gains in the crisis-hit economies in response to elimination of the subsidies to firm's investment.

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Key Word: East Asian Crisis, Dynamic GE, Investment Policy

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I. Introduction

The East Asian financial crisis is currently cited as a central uncertainty confronting the global economy and the international commodity and capital markets. Growth is expected to be slower, risks are higher, and the flows of capital have been dislocated.[2] The crisis erupted in July, 1997 when the Thai *Baht* was left to float and depreciated by 15 percent, giving way to a wave of contagion to Indonesia, Malaysia, Philippines, and South Korea. In Indonesia, the financial problems were compounded by a political crisis along with sharp increases in the price of basic consumer goods and rise in the rate of unemployment. In Korea as well, bankruptcies and unemployment rate were on the rise, where eight of the thirty largest industrial-trade conglomerates (*Chaebols*) filed bankruptcies in 1997. In Thailand, despite a bumper harvest and rising export prices, the severe contraction in industrial output led to a sharp rise in the unemployment rate to 6 percent.

No doubt, external adjustments in the region will necessitate significantly financial re-structuring to accommodate the hostile conditions of a new environment with higher interest rates, depreciation of real exchange rates, and lower domestic absorption.[3] Our main objective in this paper, however, is not limited to an anecdotal narration of the crisis, nor conjectures on its possible effects on the global world economy at large. We extensively focus on the challenges and possible strategic reform choices faced by the crisis-hit governments. Our main motivation

2 See, e.g., IMF (1997) *World Economic Outlook*, Interim Assessment, December. *The Economist*, April 11, 1998; and more recently, May 16, 1998.

3 World Bank's projections report an expected fall of about 7 percentage points in the overall GDP growth for 1998, in comparison to its projections in mid-1997. Accordingly, full recovery is expected to require two to three years.

is that the outbreak of the crisis can as well be perceived as an opportunity by the respective governments to reformulate their patterns of growth and accumulation by way of eliminating inefficient (and often politicized) interventions in the allocation of investment credit.

The "East Asian Model of Industrialization" is traditionally associated with strategic export promotion policies and heavy reliance on government's selective instruments towards setting well-defined guidelines for growth and export targets. The selected massive industrial-cum-trade conglomerates have served as the principal agents of this mission. Meanwhile, the banking system served, to a certain extent, as instruments of industrial promotion responding to the government's strategic directives, rather than financial intermediaries in charge of allocating resources to most efficient uses. In this process, the governments have used selective strategic instruments such as cheap credit provision, tax breaks, and discriminatory entry and exit barriers in the credit markets.

In this process, both the banks and the industrial conglomerates had intimate connections with each other, as well as with the government. Overall, the system was observed to suffer from inadequate supervision and a lax attitude over banks' internal control; and in many cases there was no clear commercial assessment in granting loans. It was natural to believe that the respective governments would not allow the banks to fail, and that there was full guarantee on deposits.

In the 1990s, however, the world capital markets have become increasingly integrated and the foreign capital transactions became sufficiently liberalized, as the interest ceilings in most of the countries in the region were removed and entry restrictions were relaxed. However, prudential regulation lagged behind, and the governments failed to implement the necessary

structural reforms on the banking system. The banks found themselves in a heaven of easy access to foreign funds which enabled them to incur short term foreign debt very rapidly without properly evaluating the exchange risk. Thus, a major problem was that the newly liberalized banking system was operating under highly distorted incentives, and was far from responding to the signals of the resulting deterioration in the macroeconomic fundamentals.

On the other hand, government guarantees against default were maintained not only for the banks but also for the firms. In this manner, firms in many instances have provided the main impetus for exacerbating the excess demand for investment. Consequently, the internal logic of the East Asian model had witnessed a problem of *moral hazard* in that the banks and the new financial institutions borrowed excessively from abroad and financed unprofitable projects with an excessively high exchange risk.[4]

The crisis openly exposed the long time problems of the banking system in financing firms' investment strategies, and we argue that it can also be regarded as an opportunity to re-formulate the prospective growth strategies of the region under the new set of conditions of a globalized commodity and financial market. One of the major elements in post-crisis reform is how to reduce government intervention in the firm or bank investment decision processes. It is clear that such a reform as well as reforms of credit allocation and investment management would further encourage international and domestic competition, and hence, will affect economic growth path of the region, as well as the world economy.

To analyze the possible general equilibrium outcomes of such a policy reform, we

4 See, in particular, Krugman (1998) for an analytical exposure of the moral hazard motives behind the crisis. Krugman (1996) has also argued long before the outbreak of the Thai crisis that the Asian economies had no immunity against financial breakdowns.

develop an inter-temporal (dynamic) multi-sector, multi-region (global) general equilibrium (GE) model. We primarily focus on the effects of extending the investment policy reform initiatives over the crisis region, as well as their repercussions on the global economy at large. The prevalence and nature of the linkages between globalization of the financial markets and regional capital accumulation patterns, and their effects on production, employment and income distribution can be easily captured by a such model and hence constitute the main indicators of our analytical focus.

The plan of the paper is as follows: In the next section, we provide a brief overview on the deteriorating macro economic conditions which eventually led to the outbreak of the crisis in 1997. Here we primarily focus on the culmination of the so-called problem of moral hazard, and the strategic role played by a poorly regulated and supervised banking system. In Section III, we introduce the main elements of our analytical model, and discuss its distinguishing properties. We use the laboratory characteristics of the model in Section IV to simulate two sets of policy scenarios: first, on the evaluation of the general equilibrium effects of the crisis on the East Asian Economies; and second, on the investigation of the second best policy of removal of investment subsidies in the crisis hit region. We reserve Section V for concluding comments.

II. An Overview of the Macroeconomic Conditions Leading to the Crisis

While there is no consensus on the definite causes of the crisis,[5] there is now mounting evidence that the region's economies have been confronting a deteriorating macroeconomic environment since the early 1990s. We summarize some of the salient features of this episode in

5 For a thorough review of the sources of the crisis, see Corsetti et. al. (1998), Radeli and Sachs (1998); Krugman (1998). The celebrated web sites of Roubini (www.stern.nyu.edu/~nroubini/asia/AsiaHomepage.html), and of Krugman (http://web.mit.edu/krugman/www/disinter.html) are also excellent sources of reference.

Table 1. Tables 2.1 and 2.2, on the other hand, quantify much of this deterioration.

<Insert Table 1 here> and <Insert Table 2.1-2.2 here>

First, several countries in the region experienced a real appreciation in their currencies over the 1990s, and by 1997 had sizable current account deficits (see Table 2.1). The mode of financing of these deficits was mostly through short term foreign borrowing with a consequent rise in their stock of foreign liabilities. Concomitant with this appreciation and foreign debt built up, there was an autonomous rapid inflow of foreign capital into the region. The history of sustained economic growth for more than two decades had attracted foreign portfolio and direct investment. However, in the face of shallow and underdeveloped financial systems, this had put significant strain on the intermediation and productive use of these funds in the indigenous economies of the region.

Second, there was a marked slowdown in the rate of growth of exports and industrial output. This was mainly the combined result of the slow import demand of the developed countries –mainly of Japan; a recession in the global markets for electronics and semi-conductors; and policy shifts in most Asian economies imposing contractionary demand policies to contain inflationary pressures.

Third, the rapid inflow of capital and slowing of growth in the region unveiled a host of inherent structural problems in the financial systems. Specifically, there are three sets of problems: one regards the ownership structure of the financial intermediaries. In all of the crisis affected Asian countries, until very recently most of the banks are publicly-owned. Entry is restricted, and in some it is practically nonexistent. Consequently, there was virtually no provision for bankruptcies or default. Another is the lack of supervision and regulation of the

financial sector. Bank examinations are rare and often corrupt. There is either explicit or implicit government guarantees on all bank deposits. Finally, there is heavy government intervention in credit allocation. In most of these countries, special banks (such as development banks of Korea) are set up whose sole purpose is to lend policy loans to sectors viewed as capable of "maximizing" economic growth, with no regard being paid to the expected rate of return. In Korea, for example, the banks were required to grant "policy loans" to specific sectors: heavy and chemical industries, shipping companies, and overseas construction firms in the 1970s, and small- and medium-sized firms since then. Policy loans historically have constituted between 40 and 50 percent of bank portfolios. At the end of 1996, commercial banks were said to have 4.5 trillions won of *policy loans* on their books, of which 56 percent were non-performing (Lacker and Li, 1998). Such vast government intervention led to *cronyism*, hence the *Suharto* family in Indonesia, the *Keietsu* in Japan, and the *Chaebol* in Korea.

Under these conditions, the financial intermediaries whose liabilities are guaranteed by the respective governments naturally posed a serious problem of "moral hazard" mentioned above. This resulted in excessive borrowing and lending, mostly borrowing from abroad by the banking system without proper evaluation of the exchange risk.

In retrospect, existing data reflect that the rate of growth of bank lending to the private sector was well in excess of the rate of growth of GDP throughout the 1990s. Consequently, the ratio of bank lending to GDP grew more than 50 percent in Thailand and Philippines, by 27 percent in Malaysia, 15 percent in Korea and Indonesia. Furthermore, given the implicit public guarantees on the foreign liabilities of the banking system, the interest charges at home could have been kept low, the interest rate at which domestic banks could borrow abroad and lend at

home was low, so that the domestic firms invested too much in projects that were marginal if not outright unprofitable. Hence, the percentage of non-performing loans rose rapidly to reach 16 percent in Korea and Malaysia, 17 percent in Indonesia, and 19 percent in Thailand.

Given this background, we first introduce the foundations of our analytical GE model in the next section.

III. The model

III-1. Overview

The model is based on the intertemporal general equilibrium theory with multi-region and multi-sector specification, and draws in many ways upon the recent contributions of dynamic applied GE modeling by McKibbin (1993), Mercenier and Sampaïo de Souza (1994), Mercenier and Yeldan (1997), and Diao and Somwaru (1997). The world economy is aggregated into three regions: the developing economy (*LDR*), the developed economy (*DR*) and the crisis hit Asian economy (*CAR*). In each region, there are four production sectors each of which produces a single commodity. The four aggregate production sectors are: (1) agriculture and food processes (*AGS*), (2) mineral and materials (*MNS*), (3) other manufacturing (*MFS*), and (4) services (*SRS*). All the three regions are fully endogenous in terms of their producers and consumers' economic behavior. Furthermore, we keep track of commodity trade flows by their geographical and sectoral origin and destination. Countries are further linked by an Armington system so that sectoral commodities are differentiated in demand and supply by their geographical origin.

Firms in each region produce goods and conduct capital investment so as to maximize firm's valuation. Infinitely-lived households consume home produced and imported goods to maximize an intertemporal utility function. Household income is consumed or saved in the form

of equity in domestic firms or foreign bonds. Home firm equities and foreign bonds are assumed to be perfect substitutes. Through equity purchases by households, the world "pool" of savings is channeled to profitable investment projects without regard to the national origin of savings. Technological change and population growth are exogenous and hence are assumed to be zero in the model.[6] The detailed description of the model is as follows:

III-2. Firms and investment

We assume that firms within each sector of every region can be aggregated into a representative firm. The representative firm operates with constant returns to scale technology. The value added production function for labor and capital is Cobb-Douglas, while the intensities of intermediate goods are fixed. The representative firm chooses, at each time period, the input levels of labor and intermediate goods and makes investment decision to maximize the value of the firm. With constant returns to scale technology, the number of firms does not matter. Hence, we assume that the firm finances all its investment outlays by retaining profits so that the number of firm equities within each sector of a region remains unchanged.

A starting point for specifying the firm's optimizing behavior is the condition of asset market equilibrium, i.e., the expected returns from holding the equity in the firms must be in line

$$r = \frac{d\ iv_i}{V_i} + \frac{\Delta V_i}{V_i},$$

with those from holding a 'safe' asset, such as foreign bonds, at any time period:

6 This specification has no real effects on the model, since, alternatively, we could normalize all variables in per capita terms.

where r is the world interest rate, V_i is the market value of firm i, div_i is the current dividend payments, and $\Delta V_i = V_{i,t+1} - V_{i,t}$ is the expected annual capital gain on the firm equity. Assuming an efficient world financial capital market, each region faces the same world interest rate.

Firm's intertemporal decision problem can be restated more rigorously as follows: in each region's sector i, i = 1, 2,..., 4, the representative firm chooses the optimal investment and labor employment strategies, $\{I_{i,t}, L_{,ti}\}_{t=1,..,\infty}$, to maximize the present value of all future dividend payments, taking into account expected future price of output, unit value of sectoral specific capital equipment, and labor wage, $\{P_{i,t}, PI_{i,t}, w_t\}_{t=1,..,\infty}$, and the capital accumulation constraint.

$$\text{Max } V_{i,1} = \sum_{t=1}^{\infty} R_t \; div_{i,t} \equiv \sum_{t=1}^{\infty} R_t \left[P_{i,t} \; f_i (L_{i,t}, K_{i,t}) - w_t L_{i,t} - a_{i,t} - P I_{i,t} I_{i,t} \right]$$

Formally:

$$K_{i,t+1} = (1 - \delta_i) K_{i,t} + I_{i,t}$$

subject to:

where $R_t = \Pi^t_{s=1} 1/(1+r_s)$, represents the discount factor; $I_{i,t}$ is quantity of the new capital equipment built by investment at time period t; δ_i is a positive capital depreciation rate; and a_i

$$a_{i,t} = \phi_i P_{i,t} \frac{I_{i,t}^2}{K_{i,t}}$$

represents the capital adjustment costs and has the following functional form:

Because of the presence of adjustment costs on capital, marginal products of capital differ across sectors, resulting in unequal although optimal rates of investments. We assume that labor

is perfectly mobile across sectors (but immobile internationally), and firms never face any quantity constraints. Also, the structure of newly produced capital equipment in terms of forgone sectoral goods is of Cobb-Douglas form. The forgone sectoral goods used to invest can be purchased in domestic market or imported. Hence, PI_i is a function of Armington composite

$$P I_i = \prod_j^4 PC_j^{d_j} \ , \ i = 1 , 2 , . . . , 4 \ .$$

good prices:

where PC_i is the price for the composite good I, $0 < d_i < 1$, and $\Sigma_i d_i = 1$.

III-3. The households and consumption/savings

In each region the representative household owns labor and all financial assets, namely, the equity in domestic firms and foreign bonds, and allocates income to consumption and savings

$$\text{Max} \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho} \right)^t u (TC_t)$$

to maximize an intertemporal utility function over an infinite horizon:

$$SAV_t = w_t L_t + TI_t + d\ iv_t + r_t B_{t-1} - Ptc_t TC_t$$

subject to the following current budget constraint:

where ρ is the positive rate of time preference, TC_t is the aggregate consumption, SAV_t is household savings, B_{t-1} is foreign assets and $r_r B_{t-1}$ is interest earnings from foreign bond, Ptc_t is the consumer price index, and TI_{nt} is the lump sum transfer of government revenues. We assume no independent government saving - investment behavior. "Government" spends all its tax

revenues on consumption or transfer to households and, hence, public sector borrowing requirement is not explicitly modeled. TC_t, the instantaneous aggregate consumption, is

$$TC_t = \prod_i C_{i,t}^{b_i}$$

generated from the consumption of final goods by maximizing a Cobb-Douglas function:

$$\sum_{i=1}^{4} PC_{i,t}\, C_{i,t} = Ptc_t\, TC_t \ .$$

subject to

where $C_{i,t}$ is the final consumption for good I, $0 < b_i < 1$, and $\Sigma_i b_i = 1$.

The flow of savings, SAV_t, is the demand for foreign new bonds issued by the other

$$SAV_t \equiv B_t - B_{t-1} = r_t\, B_{t-1} + FBOR_t$$

regions[7], which, in the equilibrium, reflects current account imbalance of this region:

where a positive $FBOR_t$ implies a surplus in this region's foreign trade.

III-4. The government policies

The government policy instruments include import tariffs, export taxes net of subsidies, indirect taxes imposed on production processes, and sales taxes on final consumption.[8] Our main purpose here is to capture the effects of the government interventions leading to over-investment

7 Since we assume that the number of equities of the firms in each region remains constant.

8 Further information about these instruments along with their initial levels are included in the database used for conducting the calibration and "base-run" of the model. See, Global Trade Analysis Project (GTAP) database, version 3, in McDougall (1997).

in financially-dubious projects within the crisis hit Asian economy. However, such information is not available in a quantified form in the original database. As discussed earlier, such government intervention has often taken the form of implicit insurance which is equivalent to a stock of contingent public liabilities that are not reflected by data on debt nor the deficit until the crisis occurs. Even though there were differences in the specifics of the policies pursued by the governments to enable the firms to expand their investments, they all led to the same outcome: excessive concentration of investments in certain key sectors of the economy. For these reasons, we introduce an "investment subsidy policy" to capture the basic features of the government interventions in firms' investment strategies. The subsidy is thought to be granted only for the firms in the manufacturing sector *(MFS)*, with no comparable provisions for the other three sectors.[9] To reduce the firms' risk caused by investment in *MFS*, the subsidy is designed to lower firms' capital installation (adjustment) costs in their investment process. More formally, let s_i be the subsidy rate on capital installation cost, then Eq. (1) is redefined for the region of *CAR*:

$$a_{i,t} = (1 - s_{i,t}) \phi_i P_{i,t} \frac{I_{i,t}^2}{K_{i,t}}$$

where s_i is positive for *MFS* and zero for the other three sectors in *CAR*. The investment subsidy is financed by a lump sum tax on (or a lowered government transfer to) the households.

III-5. Equilibrium

9 In Korea, excess investment and associated profitability problem was concentrated in the manufacturing sector, in other countries such as Thailand, the focus was on the real estate sector (Huh, 1997)

Intra temporal equilibrium requires that at each time period, (i) in each region, demand for production factors equals supply; (ii) in the world, total demand for each sectoral good equals total supply; (iii) in the world, aggregate household savings equals zero. In the steady state equilibrium, the following constraints must also be satisfied for each region:

$$r_{ss} = \frac{d\ iv_{ss}}{V_{ss}}$$

$$I_{ss} = \delta\ K_{ss}$$

$$FBOR_{ss} + r_{ss}\ B_{ss} = 0\ .$$

IV. Analysis of Alternative Simulations

We focus on two sets of issues and conduct two scenarios. The first scenario (*EXP-1*) is used to evaluate the general equilibrium effects of the crisis on the world economy. The *EXP-1* later is served as a "base" in the second scenario (*EXP-2*) which is designed to investigate the possible effects of eliminating government investment subsidy in the crisis hit economy. That is, in *EXP-2*, in addition to what we will do for *EXP-1*, the investment subsidy in *CAR* will be removed.

IV-1. EXP-1: General equilibrium outcomes of the crisis

In their recent paper, Corsetti, Pesenti and Roubini (1998) undertake an extensive analysis of the crisis hit Asian economies' macro economic environment and financial system before and throughout the financial crisis, and conclude that common domestic and international shocks hit several East Asian economies in the 1996-1997 period rather than a pure financial panic story. Our first policy experiment pursues along this line of argument. However, in the

absence of a full-fledged theory on financial-real economy linkages, we directly implement the *real side* consequences of the crisis on investment patterns, and shock the model to simulate the investment contraction. The East Asian financial crisis resulted in currency depreciation, increases in domestic interest rate and prices, more unemployment and high bankruptcy rate among the crisis hit Asian countries. All these will likely to cause investment to fall, and hence economic growth to slow down. Since the intertemporal GE is a real economy apparatus in which monetary terms and many financial assets are not explicitly recognized, it cannot capture the effects of currency depreciation on the world financial and asset markets directly.[10] Instead, we focus on the effects of the crisis on domestic investment in the region of *CAR* by increasing the difficulty in capital investment in this region.

Technically, we exogenously shock the technological coefficient in the investment function for the *MFS* (manufacturing) sector in the *CAR*, such that the productivity of capital investment in the regional *MFS* sector falls temporally in the first 5 years, and then slowly recovers to the original level in the following 5 years. By so doing, investment falls in the *CAR*, which sets out diverse changes in other economic indicators, both for the *CAR* region and for the world (Table 3).

Outcomes of the first simulation are comparable with the World Bank's projections in that *CAR*'s GDP falls with a fall in its investment (the World Bank, 1998). With improvements in its terms of trade, *CAR*'s exports rise and imports fall. A trade surplus, together with a low level of investment, results in current account surpluses in the *CAR*.

10 However, the apparatus allows us to introduce the concept of *real exchange rate* as the ratio of domestic versus foreign commodity baskets. See, Obstfeld and Rogoff (1996, Chp. 4) for an analytical exposition.

The effects on the world economy as well as on the other countries are also captured by the model. The world GDP falls by 0.021 percent in the first year of the simulation. GDP in the developing economy (*LDR*) falls but slightly rises in the developed economy (*DR*) in the early period in the model (Table 3). Such results are also consistent with the World Bank's projections, where it was argued that the crisis would affect developing countries more than the high-income countries. A fall in *LDR*'s GDP is mainly caused by a slight depreciation of its real exchange rate, measured by its domestic price index in terms of *DR*'s price index. With world merchandise price falling by about 0.31 percent, exports fall and imports rise in both *LDR* and *DR* regions during early period in the model. These cause *LDR*'s current account deficit to increase. For the *DR* region, change in trade flows, together with less demand for foreign capital inflows by the crisis hit economy (*CAR*), lead to a fall in the current account surplus of the *DR* region in the early period of the model (Table 3).

<Insert Table 3 here>

With its intertemporal optimization feature, the model traces the entire transitional path until a new steady state is approached sufficiently. Without further shock and any risk caused by uncertainty in the future, the model shows that world economy will eventually recover from the shock of the Asian crisis, and the steady state level of world GDP will be slightly higher than its base level (a less than 0.02 percent increase, see Table 4). This result, of course, depends on the assumption that productivity loss in the crisis hit region's capital investment will regain in the following 10 years. While for the other two regions, the shock is temporal in terms of their levels of GDP or investment, the shock on the *CAR* region is sort of "permanent", i.e., the level

of *CAR*'s GDP never recovers its base status even in the new steady state equilibrium.[11] On the other hand, changes in trade flows are permanent for all the three regions. In the new steady state, exports rise and imports fall in the region of *CAR*, while exports fall and imports rise slightly in the other two regions (Table 4).

<Insert Table 4 here>

IV-2. EXP-2: Effects of government investment policy on the economic recovery

In the second scenario, to study the possible effects of a change in government's investment policy, we eliminate government's investment subsidy in the manufacturing sector. Of course, without an explicit banking sector, the model cannot capture all effects of a change in the government's investment policy, especially the intervention in banking system and banks' businesses. Note, however, that even though the model lacks an explicit banking system, it maintains an effective financial capital market and accommodates the main attributes of financial intermediation of a market economy in a theoretically consistent framework.

In the model, the investment subsidy is employed to reduce the capital adjustment cost in the manufacturing investment. The subsidy rate is chosen such that the total subsidy is equivalent to 2.2 percent of total investment in the region of *CAR*. The subsidy is received only by firms investing in the *MFS sector*, and it is set equivalent to 40 percent of capital adjustment costs of this sector.[12]

It is obvious that such a policy will distort firms' investment decisions, leading to

11 Exogenous productivity growth and population growth are not central to our discussion and thus are all ignored in the model.

12 According to Dalla and Khatkhate (1995)'s calculation, the interest subsidy involved in policy loans in Korea amounted to about 1 percent of GNP and 6.2 percent of government expenditure in 1991; the cumulative subsidy

overinvestment in the *MFS*, and possibly under-investing in other sectors, such as services and agriculture. Hence, intuitively, removing such a subsidy would lower *MFS*'s investment and rise investment allocated in the other sectors. The simulation results of *EXP-2* show that investment in *MFS* does fall significantly, and rises in all other sectors. In Table 5, we document such sectoral investment changes in selected years, while full size transition paths for sectoral investment, together with change in sectoral output are presented in Figures 1 - 4. In the last row of Table 5, we also report change in the steady state levels of sector capital stock due to the elimination of investment subsidy.

<Insert Table 5 here>

We observe that with a fall in *MFS*'s investment after eliminating the investment subsidy, the size of *MFS*, in terms of its capital stock, contracts more than a quarter in the new steady state, while the size of other three sectors extends 1 - 2.5 percent, compared with those in the *EXP-1*. The fall in *MFS*'s investment magnifies while the rise in the other three sectors' investment slows down over time along the transition. This causes that total investment in the region of *CAR* to rise more in the early years and then less rapidly in the future as compared with those in the *EXP-1* environment (Table 7, row 1 and Figure 5). Thus, the effect of eliminating sectoral (*MFS*'s) investment subsidy on the economy-wide capital stock is positive, that is, total capital stock increases in the new steady state (Figure 6).

We observe that, in terms of production level, the size of *MFS* does not contract as much as its capital stock. Comparing with that in *EXP-1*, output of *MFS* only falls by 12 percent in the new steady state when the investment subsidy on this sector is eliminated (Table 6 and Figure 3).

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during 1981-1991 amounted to 2 trillion won per annum.

The major reason is that, with less capital supply, the marginal product of capital in *MFS* rises. This causes the *MFS* sector to employ more labor to substitute for capital in the production process. The simulation results show that relative to the other sectors, the marginal product of capital in *MFS* rises by 15 percent in the first 10 years, and by 25 percent in the new steady state.

<Insert Table 6 here>

Simulation results further show that even though *MFS*'s capital stock level falls due to slowing down of the investment allocated to this sector, increases in the marginal product of capital play a dominant role in determing its sectoral dividends. Hence, comparing with that in *EXP-1*, the *MFS*'s dividends (i.e., sectoral revenue minus labor and investment costs) rise along the transition path. This implies that the *MFS* sector becomes more "efficient" or profitable in the long-run after eliminating investment subsidy. Furthermore, with a more profitable *MFS* sector, the value of its firm's equity rises.[13]

Eliminating *MFS*'s investment subsidy also affects *CAR*'s trade structure. As shown in Table 6, comparing with those in *EXP-1*, exports rise and imports fall for the other three sectors, while for the *MFS* sector, exports and imports both rise in the short run but exports then fall along the transition to the new steady state. While the falling magnitude of the *MFS*'s exports in the steady state is quite close to that of the decline in its output, the scale of the rise in *MFS*'s imports is smaller. For the other sectors, on the other hand, the range of the fall in their imports is greater than that of the rise in their exports.

Change in the bilateral trade flows between *CAR* and the other two regions are presented

13 Value of firm's equity depends on the expected stream of firm's dividends, including dividends earned along the transition path as well as in the steady state, putting more weight on the current and less on the future.

in Table 7. Eliminating investment subsidy in *CAR* allows this region to rise exports of commodities for which it has a comparative advantage in trade. Furthermore, its exports to the region with whom it is a net exporter rise more. For example, *CAR* is a net exporter for *AGS* in the *DR*'s market but a net importer for the same aggregate good in the *LDR*'s market. When *CAR*'s exports of *AGS* rise due to the elimination of the investment subsidy, its exports of *AGS* to *DR* rise more than that to *LDR*. On the other hand, *CAR* is a net importer for *MFS* in the *DR* market but a net exporter for the same aggregate good in the *LDR* market. When *CAR*'s exports of *MFS* fall, its exports of *MFS* to *LDR* fall more than that to *DR* (Table 7).

The discussion about the sectoral effects on *CAR*'s economy due to the elimination of the investment subsidy already tells us that the *CAR*'s economy would become more efficient after such policy change. To see it more clearly, we report selected aggregate economic indicators in Table 8, together with the indirect effects on the other two regions caused by the policy change in the *CAR* region.

Effects of removal of the investment subsidy on the *CAR*'s real GDP vary according to the time frame considered. In the immediate short-run and then in the very long-run they are negative; but positive in the medium-run (i.e., the first 5 - 20 years). In comparing with that in *EXP-1*, the short- and long-run negative changes in the level of *CAR*'s GDP are in the range of less than 0.1 percent, while the medium-run's positive gains in GDP are more than 0.1 percent (e.g., 0.18 percent at the 10-th year).

We decompose changes in the regional GDP at a given year by the following:

$$\frac{\Delta GDP}{GDP} = \Sigma_i \left(\frac{\Delta X_i}{X_i} + \frac{\Delta PVA_i}{PVA_i} \right) S_i$$

where PVA_i is value-added price for output X_i and S_i is sectoral share in GDP. This equation implies that given sectoral contribution shares, total net change in a region's GDP is equivalent to the summation of changes in sectoral outputs and relative value-added prices. It is obvious that a fall in *MFS*' output (about -12 percent in the steady state) is a major factor causing *CAR*'s GDP to fall. However, as the marginal product of its sectoral capital rises, the value-added price for *MFS* rises by 15 percent (in the steady state) relatively to the other sectors' prices. This allows the *MFS*'s share in *CAR*'s GDP to rise about 0.18 percent. On the other hands, even though outputs of the other three sectors rise in *CAR*, their relative prices fall, which also contributes to a contracted GDP level. For example, a significant fall (-3 percent) in the value-added price for the *SRS* (services) relatively to the other sectors' prices causes the share of *SRS* in GDP to fall by 0.3 percent, even though the output of *SRS* rises.

The social welfare gain for *CAR* from eliminating investment subsidy is captured by a positive change in the equivalent variation index. This index is calculated from the intertemporal utility function for the consumers and takes into account both the transitional and steady state effects of the policy change, putting more weight on the current consumption and less on the future. The equation which is used to calculate the welfare gain/loss is borrowed from Mercenier and Yeldan (1997) and can be found in the Appendix.

Change in *CAR*'s investment subsidy policy also affects the other regions' economy, as well as the world economy. Such effects are summarized in Table 8, column 2 - 4, while full size transition path for each region's total investment and capital stock are in Figure 5 - 6. In

comparison with the simulation results of *EXP-1*, the effects on the developing economies are mainly negative, yet positive on the developed economies. Taking the comparison of the steady state equilibria as an example, *DR*'s total exports increases and imports fall. This allows *DR*'s consumers to enjoy a slight welfare gain. On the other hand, *LDR*'s capital stock contracts, total exports and imports both fall. *LDR*'s consumers have to face a 0.04 percent of welfare loss caused by the policy change in *CAR*. These results are best understood when account is given to the fact that current data suggest that *DR* has a comparative advantage in *MFS*'s production and hence is a net exporter of *MFS* goods. The investment subsidy on the manufacturing sector in *CAR* is equivalent to an implicit export subsidy for *MFS*. This allows *CAR* to compete with *DR* for the exports of *MFS*. Once *CAR*'s investment subsidy in *MFS* is eliminated, both regions can fully exploit their comparative advantage, and hence *DR*'s manufacturing exports rise, leading to welfare improvements. On the other hand, *LDR* has comparative advantage on the exports of *AGS* and *MNS*. When *CAR* increases its exports and reduces imports of these two sectoral commodities, it has to compete with *LDR*, and hence *LDR* is likely to be hurt from such competition.

<Insert Table 8 here>

Compared with the effects of the crisis shock, the simulated investment policy reform conducted by *CAR* generates relatively modest aggregate effects in the short- and medium-run, especially on trade flows for both the crisis-hit economy, and on the other regions. The major reason is that the expected gains from the investment policy reform should mainly be a result of improving the economy's efficiency, i.e., gains in productivity growth. The model cannot capture such a gain, however, as it is based on the neoclassic growth theory in which productivity

growth is regarded as exogenous. Even taking into account such a limitation, the long-term effects of the investment policy reform conducted by *CAR* in the model are quite impressive, for all regions. In a real-life policy setting, one may encounter many other forms of distortions in the crisis hit Asian economies in their industrial policies, banking systems, or capital markets. It can be expected that once such essential reforms are implemented by the countries of the region, adjustments in their economies as well as in the world will be much larger than what we simulate here.

V. Concluding Comments

In this paper we have investigated the analytics of post-crisis adjustments of the East Asian crisis with the aid of an intertemporal general equilibrium model. In the absence of a full fledged model of real-financial links, we tried to capture the real side effects of the crisis by way of examining its consequences on the investment demand. Our results revealed that in short-run the crisis hit Asian region would suffer a loss of GDP of 1.24 percent, and a decline in total investment of 6.4 percent.

Next we analyzed the general equilibrium results of possible policy reform on investment allocations conducted by the crisis hit economy. By eliminating the implicit investment subsidy in manufacturing, we tried to capture the efficiency gains associated with the removal of distortions to the firms' intertemporal decisions on capital accumulation. Since the investment subsidy is not explicitly observed in data, the direct income effects caused by eliminating the subsidy cannot be obtained. However, we still can obtain numerical inferences about the welfare consequences from the possible reform: in terms of equivalent variation, the reform strategy

results in welfare gains of 0.12 percent over the crisis environment (*EXP-1*).

Steven and Sachs (1998) note that the East and Southeast Asian crisis is actually a "crisis of economic success." It is expected that the crisis-hit countries will be able to recover and reinvigorate their growth patterns, even though this may take time. On the other hand, the crisis may as well be read as an opportunity for these economies to re-examine the growth strategies that they pursued in their early economic development process, and enable them to conduct the necessary policy reforms to reduce and eliminate the inefficient and often politicized interventions in the economy. Given the new constraints set by a more integrated world economy and a mobile international financial market, some policies which might have played an important role in stimulating growth thus far are facing a new challenge. For instance, the *triumvirate* of government-banking system-industrial conglomerates, was designed initially to stimulate investment in certain strategic industries --such as telecommunications and vehicles. In an economic environment in which the capital market was relatively closed and the banks' lending ability was effectively constrained by domestic savings, close government-bank-firms linkages may have been vital for mobilizing resources to allocate to a few priority infant industries and allowing these industries to grow rapidly and be able to compete in international markets.[14] However, once the country's financial capital market is opened to the world capital market, financial resource limitations are virtually removed. Under such an environment, however, the current international financial system can openly expose and almost simultaneously punish the countries' economic weaknesses. It is (therefore essential, under the conditions of a

14 See Amsden (1989), Bardhan (1990), and Westphal (1990) for a thorough overview of the Korean strategy of export-led growth. Diao, Roe and Yeldan (1998), in turn provide an endogenous growth modeling perspective to the "Asian model".

financially globalized world economy, for countries to maintain consistent and coherent economic policies.

It is clear that understanding this macroeconomic phenomena with its microeconomic foundations within the context of a model with general equilibrium outcomes based on rational behavior and optimization is no easy task, and the current state of our knowledge is not yet developed to capture all this detail in a unified framework. However, we believe that the intertemporal framework within an applied GE setting is a good head start to enhance our understanding on *what is to be done* given the macroeconomic fundamentals emerging from the crisis.

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Table 1. Macroeconomic Fundamentals and the Banking System of East Asian Countries
Macroeconomic Indicators
(1) *on the good side...* -- strong GDP growth Average growth rate of 7% in the 1990s, slight slowdown in 1996. -- high investment rate Above 30% of GDP throughout the 1990s (except the Philippines), however most in non-traded sector. -- balanced government budget Fiscal balance of the central government in surplus or a small deficit as a share of GDP. -- low inflation Single-digit inflation rates throughout the 1990s for all the countries.
(2) *on the bad side...* -- marked slowdown in exports Increasing trade imbalance for most countries especially since 1995. -- increasing current account imbalances Large and increasing current account deficits for most countries, Thailand and Malaysia largest and most persistent. -- appreciating real exchange rates A real appreciation of the pegged Asian currencies since 1995. -- accumulating short term foreign currency dominated debt The ratio of short-term external liabilities to foreign reserves over 100% in many countries.
Banking System
-- virtually no competition in business lending The majority of the banks government owned except in Thailand. -- widespread of policy loans Policy loans a big part of bank loan portfolios (averaging 30-40% in Korea and Indonesia) -- explicit and implicit government guarantee Traditionally bad loans consistently bailed out by the government. -- lack of bankruptcy law or lack of its enforcement Bankruptcy law nonexistent or not enforced in most of the countries. -- nontransparent accounting rules Largely inconsistent with international standards, loose definition of nonperforming loans.

Table 2.1 Selected Macroeconomic Indicators of Some Asian Economies

GDP Growth

	1991	1992	1993	1994	1995	1996
Korea	9.13	5.06	5.75	8.58	8.94	7.13
Indonesia	6.95	6.46	6.50	7.54	8.22	7.98
Thailand	8.41	7.77	8.27	8.85	8.68	6.66

Current Account (% of GDP), NIA definition

	1990	1991	1992	1993	1994	1995	1996
Korea	-1.24	-3.16	-1.70	-0.16	-1.45	-1.91	-4.89
Indonesia	-4.40	4.40	-2.46	-0.82	-1.54	-4.25	-3.41
Thailand	-8.74	-8.61	-6.28	-6.50	-7.16	-9.00	-9.18

Real Exchange Rate, end of year data

	1990	1991	1992	1993	1994	1995	1996
Korea	97.1	91.5	87.8	85.2	84.7	87.8	86.8
Indonesia	97.4	99.6	100.8	103.8	101.0	100.5	105.1
Thailand	102.2	99.0	99.7	101.9	98.3	101.7	107.6

Data Source: IMF and Corsetti, Pesenti and Roubini (1998)

Table 2.2 Selected Measurement of the Banking System of Some Asian Countries

Market Shares, Korea, 1996

	deposits	loans and discounts
Commercial Banks	23.3	27.4
Specialized Banks	9.0	14.5
Non-bank financial Intermediaries	67.7	58.1

Number and Market Shares of Total Banking Assets, Indonesia

	1982		1991	
	share	number	share	number
State Banks	73.7	5	45.2	5
Private Banks	11.3	70	37.7	119
Foreign and Joint-venture banks	7.0	11	7.7	29
development banks	8.0		9.3	
Total	100	86	100	153

Market Shares, Thailand, 1980 and 1992

	1980	1992
Commercial Banks	82.0	87.0
Agricultural Cooperatives	1.6	0.6
Savings Cooperatives	1.2	2.6
Government Savings Bank	7.7	5.2
Bank for Agricultural and Agricultural Cooperatives	4.7	2.6
Government Housing Bank	2.8	2.0

Source: Lacker and Li (1998)

Nonperforming Loans

	1997
Korea	16%
Indonesia	17%
Thailand	19%

Source: BIS; Jardine Fleming.

Appendix I: Equations and Variables in the Model

A.1. List of equations

The time-discrete intertemporal utility

$$U_{n,1} = \sum_{t=1}^{T} \left(\frac{1}{1+\rho}\right)^{t} \ln(TC_{n,t}) + \ln(TC_{n,T}) \frac{(1+\rho)^{1-T}}{\rho}$$

$$TC_{n,t} = \prod_{i} CD_{n,i,t}^{b_{n,i}}$$

Intertemporal value of firms

$$V_{n,i,1} = \sum_{t=1}^{T} \frac{1}{-_{s=t}(1+r_s)^{t}} div_{n,i,t} + div_{n,i,T} \frac{(1+r_T)^{1-T}}{r_T}$$

$$div_{n,i,t} = PVA_{n,i,t}\ L_{n,i,t}^{\alpha_{n,i}}\ K_{n,i,t}^{1-\alpha_{n,i}} - wl_{n,t}\ L_{n,i,t} - PVA_{n,i,t}\left(1 - s_{n,i,t}\right)\phi_{n,i} \frac{I_{n,i,t}^{2}}{K_{n,i,t}} - P\, I_{n,i,t}\, I_{n,i,t}$$

Within period equations (time subscript t is skipped)

A.1.1 Armington functions

$$PMM_{n,i} = \frac{1}{Y_{n,i}} \left[\sum_{s} \theta_{s,n,i}^{\sigma m_{n,i}} \left(\frac{1 + tm_{s,n,i}}{1 - te_{s,n,i}}\ PX_{s,i}\right)^{1-\sigma m_{n,i}}\right]^{\frac{1}{(1-\sigma m_{n,i})}}$$

$$PC_{n,i} = \frac{1}{\Lambda_{n,i}} \left[\beta_{n,i}^{\sigma mm_{n,i}}\ PMM_{n,i}^{1-\sigma mm_{n,i}} + (1-\beta_{n,i})^{\sigma mm_{n,i}}\ PX_{n,i}^{1-\sigma mm_{n,i}}\right]^{\frac{1}{(1-\sigma mm_{n,i})}}$$

$$M_{s,n,i} = Y_{n,i}^{1+\sigma m_{n,i}} \left[\frac{\theta_{s,n,i}\, PMM_{n,i}}{\left(\frac{1 + tm_{s,n,i}}{1 - te_{s,n,i}}\right) PX_{s,i}}\right]^{\sigma m_{n,i}} MM_{n,i}$$

$$MM_{n,i} = \Lambda_{n,i}^{1+\sigma mm_{n,i}} \left[\beta_{n,i} \frac{PC_{n,i}}{PMM_{n,i}}\right]^{\sigma mm_{n,i}} C_{n,i}$$

$$D_{n,i} = \Lambda_{n,i}^{1+\sigma mm_{n,i}} \left[(1-\beta_{n,i}) \frac{PC_{n,i}}{PX_{n,i}}\right]^{\sigma mm_{,n}i} C_{n,i}$$

A.1.2 Value added and output prices

$$PVA_{n,i} = \frac{1}{A_{n,i}\,\alpha_{n,i}^{\alpha_{n,i}}\,(1 - \alpha_{n,i})^{1-\alpha_{n,i}}}\; wl_n^{\alpha_{n,i}}\; wk_{n,i}^{1-\alpha_{n,i}}$$

$$PX_{n,i} = PVA_{n,i} + \sum_j PC_{n,j}\; IO_{n,i,j}$$

A.1.3. Factor market equilibrium

$$\sum_i \alpha_{n,i}\; PVA_{n,i}\; X_{n,i} = wl_n\; LB_n$$

$$(1 - \alpha_{n,i})\; PVA_{n,i}\; X_{n,i} = wk_{n,i}\, K_{n,i}$$

A.1.4. Demand system

$$CD_{n,i} = \frac{b_{n,i}\;(Y_n - SAV_n)}{PC_{n,i}}$$

$$INTD_{n,j,i} = IO_{n,j,i}\; X_{n,i}$$

$$INVD_{n,i,j} = \frac{d_{n,i,j}\; P\,I_{n,j}\; I_{n,j}}{PC_{n,i}}$$

A.1.5. Household income

$$Y_n = wl_n\, LB_n + \sum_i div_{n,i} + TI_n + r\, B_n$$

A.1.6. Commodity market equilibrium

$$C_{n,i} = CD_{n,i} + GD_{n,i} + \sum_j INVD_{n,i,j} + \sum_j INTD_{n,i,j}$$

A.1.7. Trade surplus

$$FB_n = \sum_i \sum_s (PWM_{n,s,i}\, M_{n,s,i} - PWM_{s,n,i}\, M_{s,n,i})$$

<u>Dynamic difference equations</u>

A.1.8. Euler equation for consumption

$$\frac{Y_{n,t+1} - SAV_{n,t+1}}{Y_{n,t} - SAV_{n,t}} = \frac{1 + r_{t+1}}{1 + \rho}$$

A.1.9. No-arbitrage condition for investment

$$q_{n,i,t} = P\, I_{n,i,t} + 2\, PVA_{n,i,t} (1 - s_{n,i})\, \phi_{n,i} \frac{I_{n,i,t}}{K_{n,i,t}}$$

$$(1 + r_t)\, q_{n,i,t-1} = wk_{n,i,t} + PVA_{n,i,t} (1 - s_{n,i})\, \phi_{n,i} \left(\frac{I_{n,i,t}}{K_{n,i,t}}\right)^2 + (1 - \delta_{n,i})\, q_{n,i\ t}$$

A.1.10. Capital accumulation

$$K_{n,i,t+1} = (1 - \delta_{n,i})\, K_{n,i,t} + I_{n,i,t}$$

A.1.11. Foreign assets

$$B_{n,t+1} = (1 + r_t)\, B_{n,t} + FB_{n,t}$$

A.1.12. Terminal conditions (steady state constraints)

$$\delta_{n,i}\, K_{n,i,T} = I_{n,i,T}$$
$$r_T\, V_{n,i,T} = div_{n,i,T}$$
$$r_T\, B_{n,T} + FB_{n,T} = 0$$
$$r_T = \rho$$

A.1.13. Welfare criterion (Equivalent variation index)

$$\sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t \ln\left(\hat{TC}_n (1 + \varphi_n)\right) = \sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t \ln\left(TC_{nt}\right)$$

where $\hat{TC}_n$ is base year's total consumption. That is, welfare gain resulting from the policy change is equivalent from the perspective of the representative household to increasing the reference consumption profile by φ_n percent.

A.2. Glossary

A.2.1 Parameters

Y_{ni} shift parameter in Armington import function for good i in region n

Λ_{ni} shift parameter in Armington composite function for good i in region n

A_{ni} shift parameter in value added function for sector i in region n

A_{nik} shift parameter in capital good production function for sector i in region n

b_{ni} share parameter in household demand function for good i in region n

c_{ni} share parameter in government demand function for good i in region n

α_{ni} share parameter in value added function of sector i for labor in region n

θ_{sni} share parameter in Armington import function for good i in region n imported from s

β_{ni} share parameter in Armington function for composite good i imported by region n

d_{nij} share parameter in capital good production function for input i in sector j and region n

σm_{ni} elasticity of substitution in Armington import function for good i in region n

σmm_{ni} elasticity of substitution in Armington composite function for good i in region n

IO_{nij} input-output coefficient for good i used in sector j and region n

ρ rate of consumer time preference

δ_{ni} capital depreciation rate in sector i region n

φ_{ni} a constant in capital adjustment function in sector i

A.2.2. Exogenous variables

LB_n fixed labor supply in region n

s_{nit} investment subsidy tax rate for sector i in region n

A.2.3. Endogenous variables

PWM_{nsit} world price for good i from region n to s

PMM_{nit} composite import price for good i in region n

PX_{nit} producer price for good i in region n

PC_{nit} composite good price for good i in region n

PVA_{nit} price of value added for good i in region n

PI_{nit} unit price of investment quantity in sector i region n

q_{nit} shadow price of capital in sector i region n

div_{nit} dividend in sector i region n

wl_{nt} wage in region n

wk_{nit} marginal product of capital in sector i region n

r_t world interest rate

X_{nit} output of good i in region n

C_{nit} total absorption of composite good i in region n

D_{nit} own good i in region n

M_{nsit} trade flow of good i exported from region n to the destination region s

MM_{nit} composite import good i in region n

TC_{nt} household aggregate consumption in region n

CD_{nit} household demand for composite good i in region n

TI_{nt} government transfer in region n

$INVD_{njit}$ investment demand for composite good j in sector i region n

$INTD_{njit}$ intermediate demand for composite good j in sector i region n

Y_{nt} household income in region n

SAV_{nt} household savings in region n

L_{nit} labor employed in sector i region n

K_{nit} capital stock in sector i region n

I_{nit} investment quantity in sector i region n

FB_{nt} trade surplus of region n

B_{nt} foreign assets in region n

Change in Crisis Hit Asian Economy's Sectoral Investment and Output after Eliminating Investment Subsidy

% change from the first scenario

Figure 1

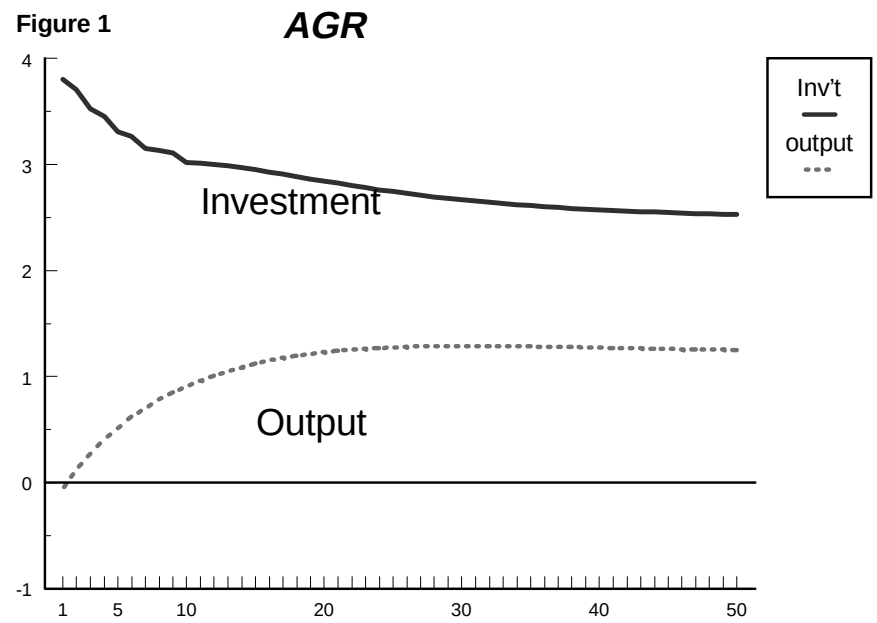


Figure 3

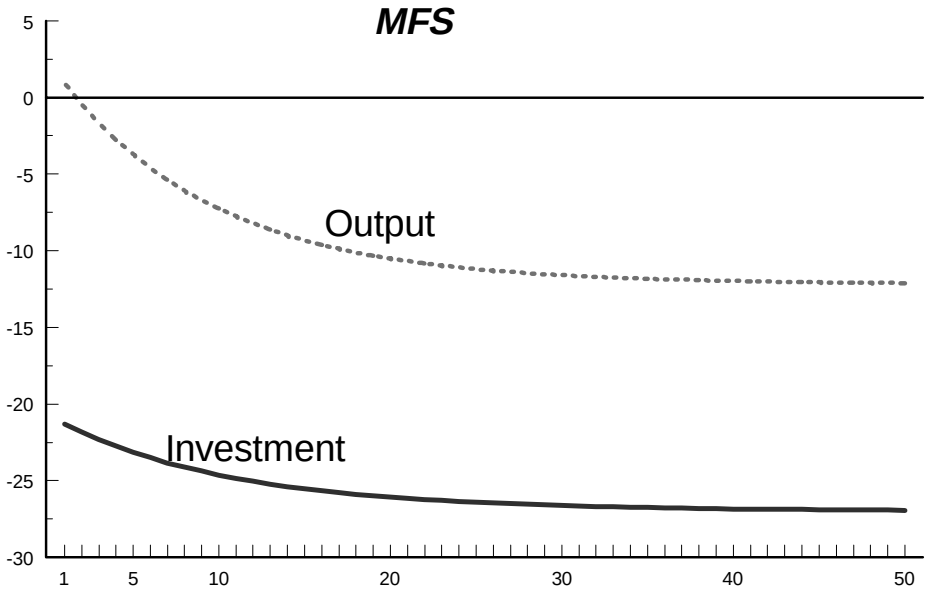


Figure 2

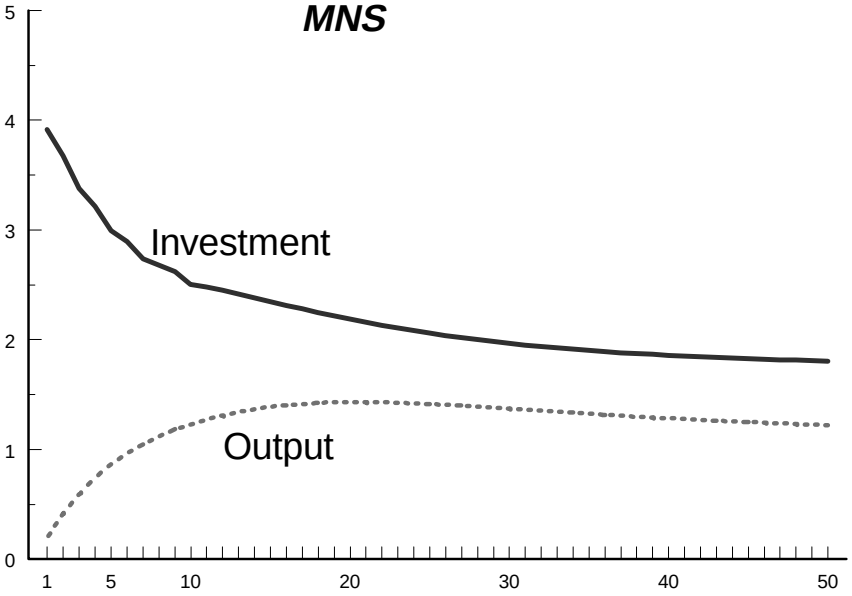
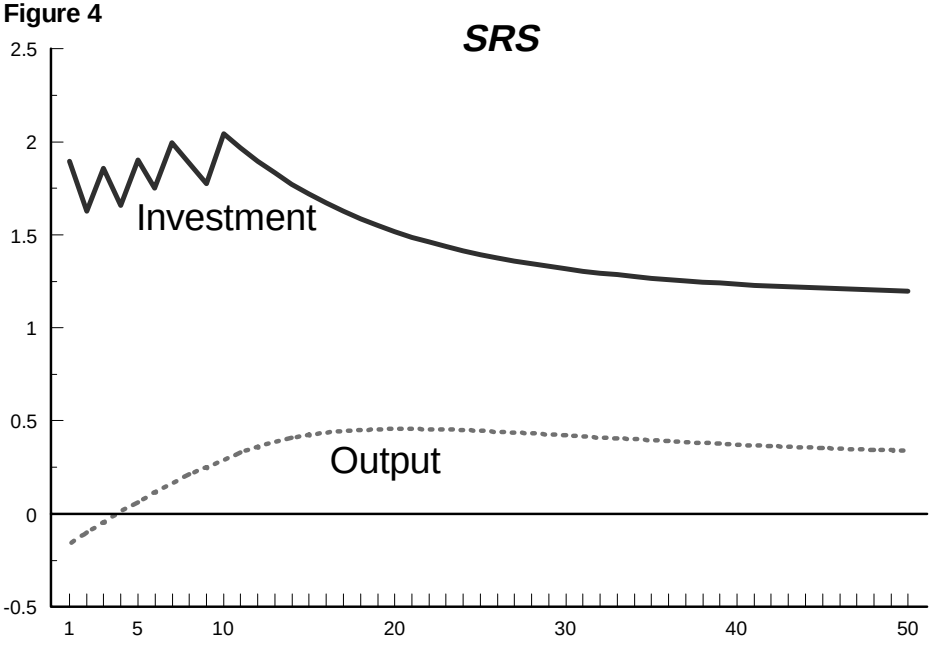


Figure 4



Change in Total Investment and Capital Stock after Eliminating Investment Subsidy in Crisis Hit Asian Economy

% change from the first scenario

Figure 5

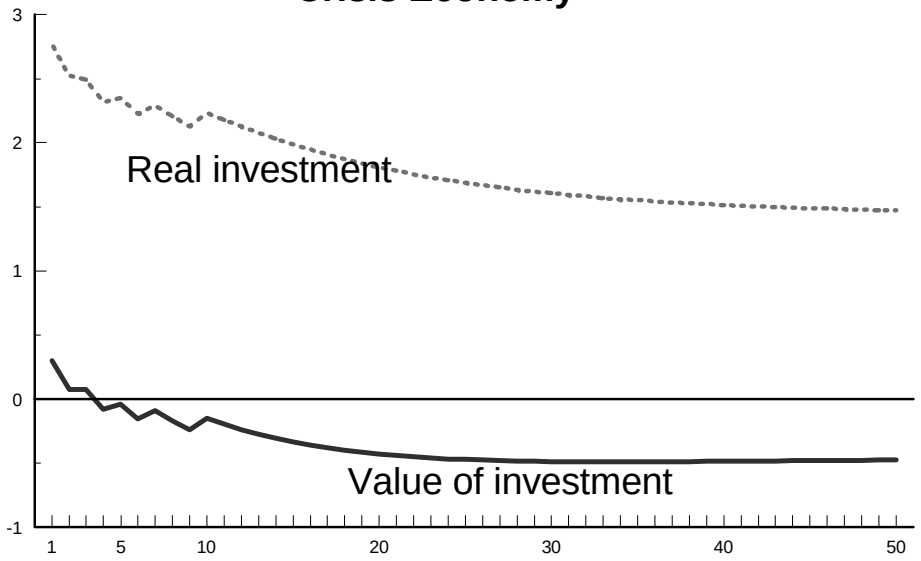


Figure 7

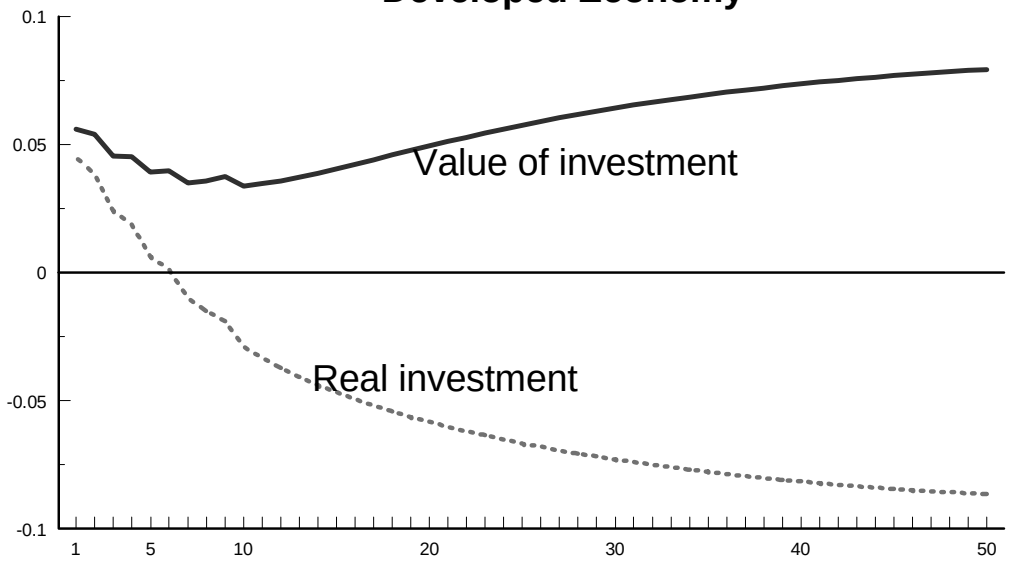


Figure 6

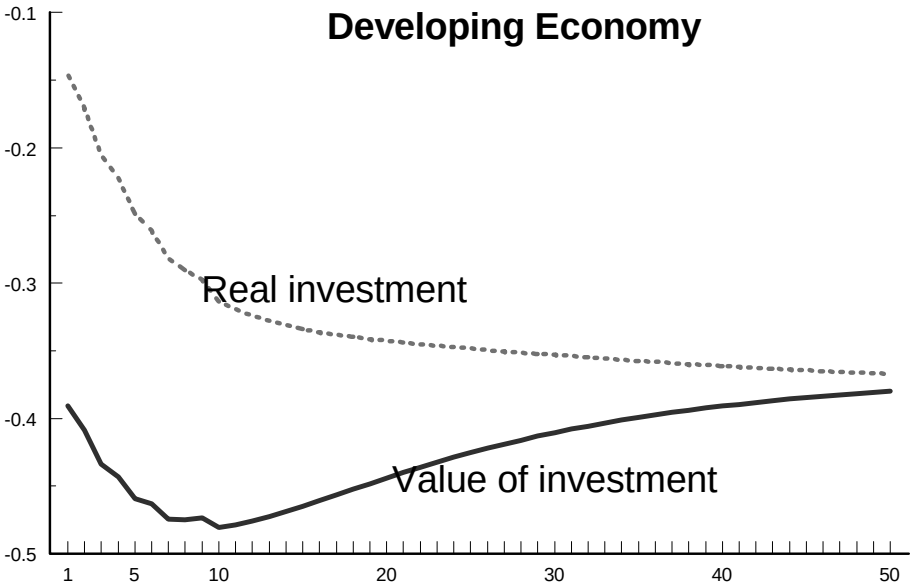


Figure 8

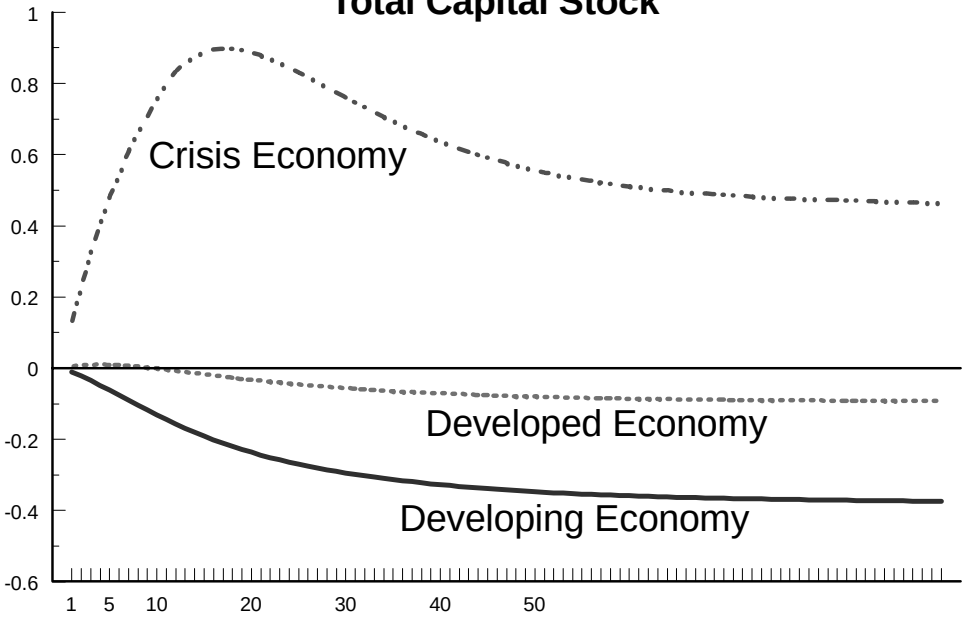


Table 3. General Equilibrium Outcomes Caused by a Fall in Investment

% change from the base

	Crisis Hit Asian Economy			Developing Economy			Developed Economy		
	Year 1	Year 5	Year 10	Year 1	Year 5	Year 10	Year 1	Year 5	Year 10
Total Investment	-6.36	-2.29	0.37	0.50	0.30	0.12	0.26	0.18	0.10
GDP	-1.24	-0.77	-0.46	-0.01	0.15	0.23	0.01	0.12	0.16
Current Account (change in $billion)	23.33	7.19	-5.55	-1.45	-0.39	0.41	-21.89	-6.80	5.14
Total Exports	1.27	-0.16	-1.14	-0.58	0.03	0.47	-1.48	-0.35	0.32
Total Imports	-6.49	-5.51	-4.61	0.43	0.09	-0.07	8.65	7.22	6.38
Real exchange rate(1)	-1.21	0.54	1.13	-0.04	0.01	0.03			

(1) The price index of Developed Economy as a numeraire

Table 4. Change in the Steady State's Equilibrium Caused by the Crisis

% change from the base

	World	*CAR*	*DR*	*LDR*
Total Investment		-0.160	0.058	0.044
GDP	0.018	-0.297	0.067	0.073
Total Exports	-0.026	0.388	-0.367	-0.115
Total Imports		-0.436	0.158	0.135

Table 5. Change in Crisis Hit Asian Economy's Sectoral Investment after Eliminating Investment Subsidy

(% change from the first scenario)

	AGR	*MNS*	*MFS*	*SRS*
year 1	3.81	3.92	-21.31	1.90
year 5	3.31	2.30	-23.15	1.90
year 10	3.02	2.51	-24.64	2.04
Steady State	2.49	1.76	-27.00	1.17
Stock of capital in the Steady States	2.49	1.76	-27.00	1.17

Table 6. Sectoral Effects on the Crisis Hit Asian Economy after Eliminating Investment Subsidy

(% change from the first scenario)

	AGR		*MNS*		*MFS*		*SRS*	
	Year 1	SS	Year 1	SS	Year 1	SS	Year 1	SS
Outputs	-0.06	1.22	1.93	1.14	0.97	-12.13	-0.16	0.30
Exports	0.84	3.11	0.52	3.52	0.50	-11.87	0.47	1.74
Imports	-1.61	-3.60	-1.61	-4.82	0.50	7.61	-1.32	-3.14

Table 7. Change in Crisis Hit Asian Economy's Trade Flows after Eliminating Investment Subsidy

% change from the first scenario

	Exports to: Developing Economy			Developed Economy		
	Year 1	Year 10	SS	Year 1	Year 10	SS
AGR	0.31	1.96	2.72	0.85	2.41	3.13
MNS	0.13	2.31	3.00	0.54	2.89	3.54
MFS	0.21	-9.47	-1.51	0.52	-7.18	-1.17
SRS	-0.14	0.83	1.26	0.50	1.39	1.77
	Imports from: Developing Economy			Developed Economy		
	Year 1	Year 10	SS	Year 1	Year 10	SS
AGR	-1.28	-2.47	-3.08	-1.64	-2.98	-3.64
MNS	-0.54	-3.46	-4.77	-0.88	-3.80	-4.82
MFS	0.94	5.68	8.47	0.49	5.01	7.60
SRS	-1.36	-2.76	-3.53	-1.32	-2.53	-3.13

Table 8. General Equilibrium Outcomes Caused by Eliminating Investment Subsidy in Crisis Hit Asian Economy

% change from the first scenario

	Crisis Hit Asian Economy			Developing Economy			Developed Economy			World		
	Year 1	Year 10	SS	Year 1	Year 10	SS	Year 1	Year 10	SS	Year 1	Year 10	SS
Value of Total Investment	0.30	-0.15	-0.46	-0.39	-0.48	-0.37	0.06	0.03	0.09			
Total Capital Stock			0.46			-0.37			-0.09			
GDP	-0.04	0.18	-0.07	-0.01	-0.08	-0.22	0.01	0.01	-0.03	-0.09	-0.12	-0.12
Terms of Trade	-0.07	0.05	0.28	0.00	-0.16	-0.24	0.07	-0.02	-0.22			
Current Account (1)												
(change in $billion)	7.80	4.25		0.59	0.22		-8.39	-4.47				
Total Exports	0.53	0.22	-0.35	0.04	-0.41	-0.60	-0.47	0.16	0.76	0.00	0.14	0.20
Total Imports	-0.47	0.15	0.75	-0.34	-0.35	-0.32	0.57	0.23	-0.28			
Welfare Index (2)			0.11			-0.04			0.003			

(1) In the steady state, current account has to be balanced. Number for Developed Economy indicate current account surpluses fall.

(2) See Appedix for the defition of welfare index.