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An Analysis of the Asian Crisis by a Capital-Linked

Multicountry Model

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Where the causes of the Asian financial crisis are concerned, we believe that a structural accumulation of trade deficits is a more fundamental cause than a failure of financial controls. Among Asian countries that are targets of international arbitrage, chronic trade deficits have led to a shortage of foreign currency reserves, making it impossible for such countries to prop up their own currency through buying.

Thus, forecasting future movements in these structural trade deficits has relevance to forecasting the course of the currently depressed exchange rates. Predicted results produced by the "Kyoto University Pacific Rim Econometric Model" maintained by the author reveal an overall stabilization and moderate improvement in the real exchange rates of the Asian currencies.

Using the same model, we investigated the effects of capital flight on individual Asian countries, based on a theory that a rise in productivity in the U.S. attracts capital, which has a negative effect on several other countries. Results indicated that the ASEAN countries' crisis will not continue in the long run, and that the crisis in South Korea should be seen as the origin of an overall decline in the rate of growth.

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I Foreign Trade Balance and Exchange Rate

The principal factors held up as the causes of the Asian monetary crisis are (1) the "bubble" economy, its excessive reliance on short-term capital, and other failures in financial control, and (2) readjustment of exchange rates intended to bring about balanced foreign trade. The authors believe that the first set of factors is no more than a proximal cause, while the second set is fundamental. The reasoning here is that even if financial controls were largely in place, trade deficits could not persist in the long run, and exchange rates would ultimately have to be adjusted. The argument also stems from the realization that among targets of international arbitrage, chronic trade deficits have led to a shortage of foreign currency reserves, making it impossible for such countries to prop up their own currency through buying. This reasoning would indicate that long-term trade deficits are the basic cause of the recent currency falls.

It is also true that Taiwan and other trade-surplus countries have felt the effects of the recent turmoil, albeit slightly, but rather than ascribing these to country-specific causes, we suggest that the pervasive currency falls in other Asian countries may be due to a predicted negative effect operating through capital movements and trade. This explanation would also account for the relatively unscathed transition through the crisis in such cases. The depth of the Indonesian crisis results from a miscalculated political response.

Even if such trade deficits are indeed a fundamental cause of the crisis, we believe that if currencies were not pegged to the dollar and slow, orderly currency falls resulted, pervasive crisis conditions like those of the present would not have developed. The significance of this is that while the present "governmental failures" deriving from the dollar peg system are an important lesson for the future, the suggestion that a fundamental cause of the currency falls does not lies within the dollar peg system itself must be corroborated now.

Stated in reverse, previously overvalued Asian currencies were a fundamental cause of trade deficits, and the present currency adjustments have brought about a contrary improvement in trade balances. In reality, a reduction in imports after the currency crisis gave Thailand its first current account surplus in fourteen years, in October, 1997. Malaysia in 1997 also recorded its first trade surplus in four years. South Korea shifted to a surplus position as of the end of 1997, and its surplus in 1998 has become the largest in its history. The margin of surplus increased even in Indonesia. A consequent recovery in the exchange rates of these countries' currencies has already been seen except for the Indonesian rupia. This is same as prior currency crises in the world (see IMF (1998)). Of course, the background of contractionary fiscal policy and other efforts in each country cannot be ignored.

Figure 1 below is a graph of Asian currency movements over several years. As the figure shows, China undertook an initial currency devaluation at the beginning of 1994, and the yen declined beginning roughly in the summer of 1995. Following a long period of high values of Asian currencies versus the yen and the Chinese yuan (which engendered long-term trade deficits), we see the current fall in these currencies. As
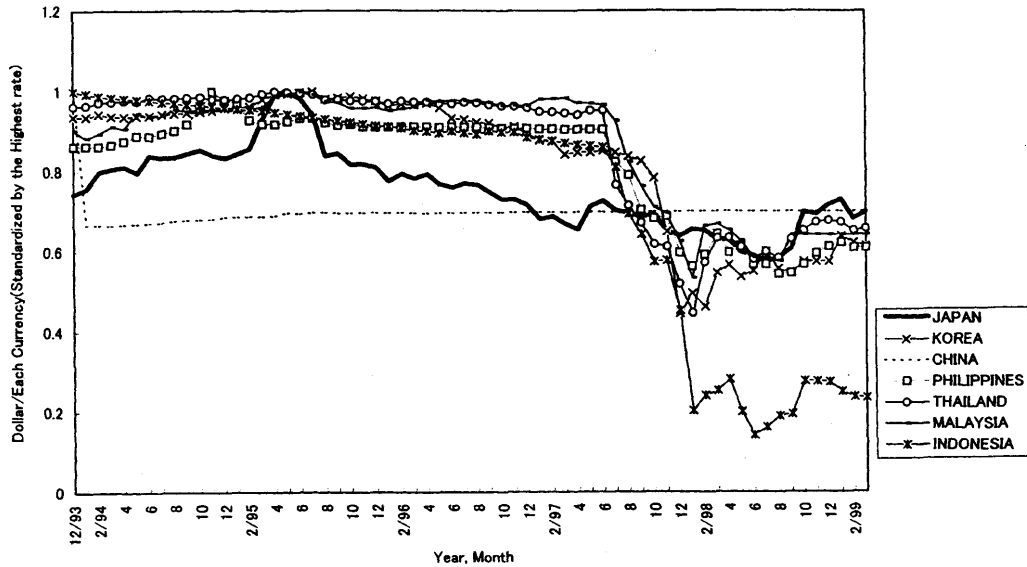
Figure 1: Exchange Rates of the Asian Currencies after 1994

shown, adjustment speed of the Asian currencies versus other principal currencies is extremely slow. In other words, adjustment of trade balances to exchange rates is rapid, while adjustment of exchange rates to trade balances is incomplete. Even though this divergence from underlying fundamentals is central to the crises, the essence of the situation remains that the crisis have served as a means to adjust this divergence to such fundamentals.

II Trade Balance and Long-term Exchange Rate Projection

What we first must ascertain is whether it was inevitable that these necessary currency adjustments occurred precipitously. In other words, even if a currency fall itself was inevitable, it was difficult to predict when the currency would fall. We therefore begin with a quantitative analysis addressing the issue at a level excluding the question of when a currency fall will occur; essentially, a level merely inquiring whether a decline is a trend or not. For this purpose, this report uses the international linkage model that we have recently developed, the "Kyoto University Pacific Rim Econometric Model (KYPAC-5.3)."

Since space does not permit a detailed description of the model here, details are left to Ohnishi (1998a, 1998b) and the Kyoto University Pacific Rim Database (http://pacific.kyoto-u.ac.jp/text/index.htm), and only the following characteristics of the model are described here in brief.

(1) The primary objective of the model is to track long-term changes. Therefore, GDP is determined not by demand side but by supply side through Cobb-Doublas production functions whose explaining variables are capital stock and labor. Then, growth rate of capital stock and labor are determined by macro saving rate and

(marginal) productivity of capital and labor. Functions of labor force growth rate
are based on Barro=Becker's fertility rate theory (Barro & Becker (1989), Becker
& Barro (1988)).

(2) This model was built not as a trade link model but as a capital link model which fo-
cuses on international capital movement. Here, capital is assumed to shift from
lower profit rate (i.e. marginal productivity of capital) countries to higher profit
rate countries. Therefore, capital balance is a function of the ratios of its con-
cerned country's profit rate to other countries' profit rates. Trade balance is deter-
mined by a statistical equation as a function of capital balance, because balance of
payments plus balance of capital must be zero by its definition and trade balance
is the major part of balance of payments. Explaining variable of real exchange rate
function is trade balance/GDP ratio.

(3) The ten economies of the U.S., Japan, South Korea, China, Taiwan, the Philippines,
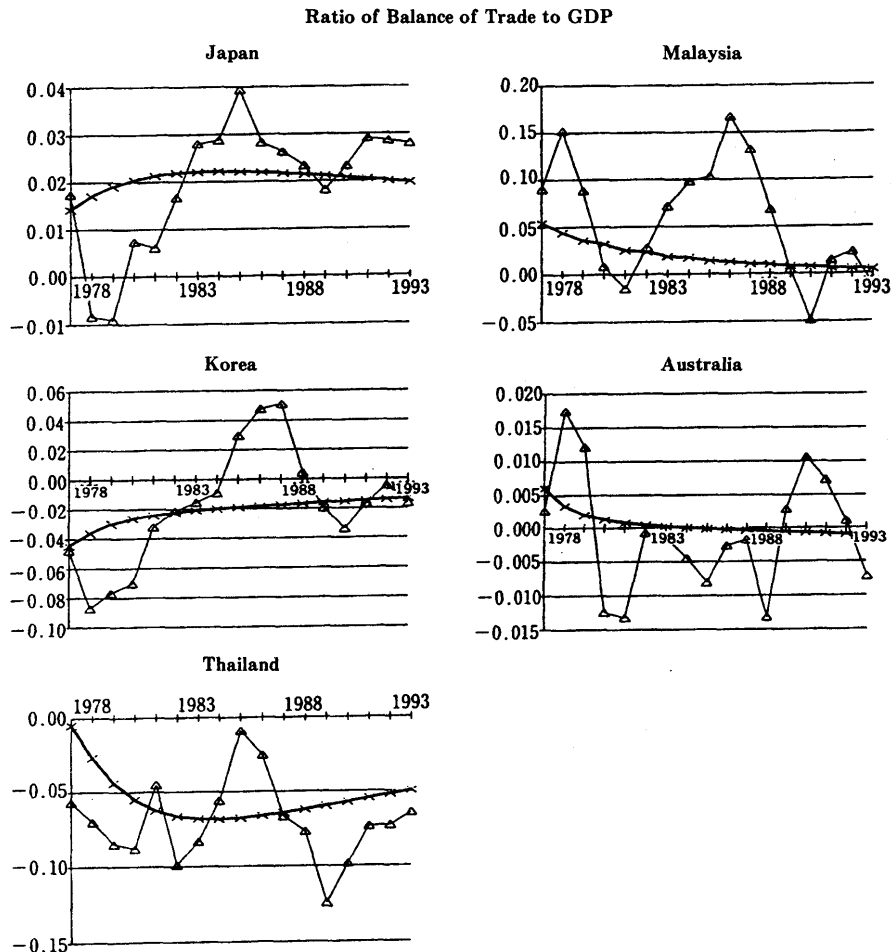Thailand, Malaysia, Indonesia, and Australia make up the studied region, and each

Ratio of Balance of Trade to GDP

Figure 2: Result of the Final Test

Capital Labor Ratio
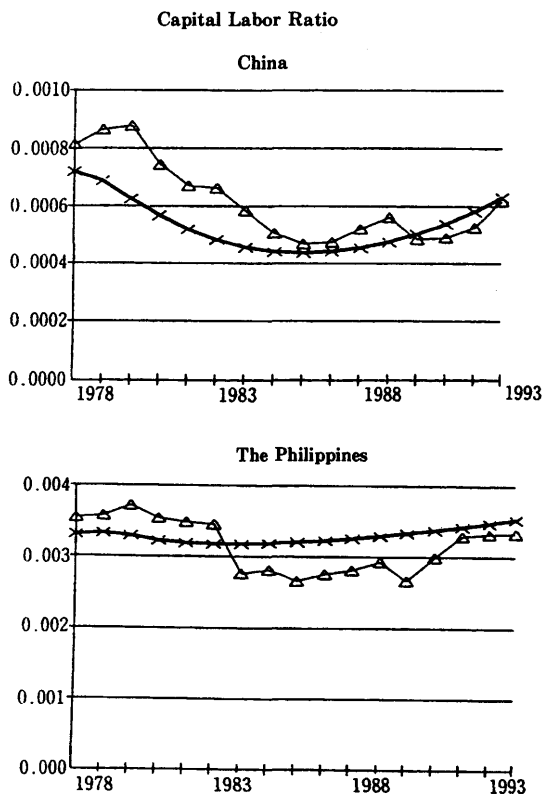
China

The Philippines

Figure 2: Result of the Final Test

region's macro model has the same structure. However, we use only eight Asian regions' results of our projection among ten regions.

The model is also characterized by a deport of exogenous variables, excluding seven dummy variables, but the foregoing three characteristics are the important ones in the context of this paper. The first among these three characteristics is expressed graphically in the following Figure 2. In this figure, the segments connected by the $\triangle$ symbol represent the actual history, and those connected by the $\times$ symbol represent an *ex post* estimation calculated by this model. Though smooth fluctuations like those of the capital-labor ratio (the most important variable in this model) are tracked relatively well in interim periods, only the overall trend is tracked successfully for widely fluctuating variables such as the trade balance/GDP ratio; however, this is not unsatisfactory for estimating long-term movements. The significance of this is that while the model cannot track sudden changes like those occured in this crisis, it can still predict long-term movements. It is important to know whether the current crisis is transient or likely to persist indefinitely, and the relevant results of long-term projections made out through 2025 using this model are shown in Tables 1 through 3.

Table 1 shows real exchange rate projections calculated by this model for the eight Asian regions. Here, "real exchange rates" are defined by assuming identical inflation rates in each economy. The end to the decline and the modest recovery of

exchange rates that we have seen for individual Asian economies are well predicted except for the Indonesian rupia, although these projections were calculated at the end of 1997. Especially, the projections for the currencies of Japan, Taiwan, Thailand and Korea are surprisingly close to the present rates. As mentioned above, these projections for exchange rates are based on the projections for trade balance.

Table 2 shows GDP projections on a "real dollar" base, where the word "real" indicates adjustment to the U.S. rate of inflation. The first striking result is that growth rates in the period of 1995-2000 in Thailand, Malaysia, Indonesia, and South Korea are negative, although those in the period of 1995-1997 were high. However, growth rates recover thereafter. The implication is that the current crisis is best perceived as a only

Table 1: Projected Real Exchange Rates through 2025
          (each currency/dollar)

	actual		projection					
	Bottom rate	1999, April	2000	2005	2010	2015	2020	2025
JAPAN	145	118	118	105	98	94	91	89
KOREA	1739	1217	1124	1083	1053	1029	1011	1000
CHINA	8.29	8.28	8.23	8.39	8.28	7.91	7.41	6.87
TAIWAN	34.9	32.8	32.5	33.5	32.5	32.7	33.0	33.5
PHILIPPINES	43.8	38.1	32.6	31.9	31.5	31.2	31.1	31.0
THAILAND	55.7	37.5	38.1	37.1	36.3	35.8	35.4	35.1
MALAYSIA	4.61	3.80	3.36	3.30	3.26	3.24	3.23	3.23
INDONESIA	14975	8650	3382	3439	3493	3534	3564	3586

Table 2: Projected GDP (billion dollar, at constant prices in 1995)
          (each currency/dollar) (average growth rates before 5 years ago in parenthesis)

YEAR	1995	2000	2005	2010	2015	2020	2025
JAPAN	4711	4130 (−2.6)	4488 (1.7)	4813 (1.4)	5115 (1.2)	5401 (1.1)	5673 (1.0)
KOREA	456	440 (−0.7)	558 (4.9)	666 (3.6)	767 (2.8)	863 (2.4)	958 (2.1)
CHINA	691	849 (4.2)	1273 (8.4)	2117 (10.7)	3623 (11.4)	6428 (12.2)	12328 (13.9)
TAIWAN	261	292 (2.3)	350 (3.7)	399 (2.7)	443 (2.1)	483 (1.8)	523 (1.6)
PHILIPPINES	74	84 (2.6)	117 (6.8)	161 (6.6)	224 (6.8)	314 (7.0)	446 (7.3)
THAILAND	167	153 (−1.7)	213 (6.9)	288 (6.3)	384 (5.9)	503 (5.6)	653 (5.4)
MALAYSIA	80	74 (−1.5)	93 (4.7)	114 (4.0)	120 (1.0)	128 (1.4)	195 (8.7)
INDONESIA	201	139 (−7.1)	184 (5.7)	257 (7.0)	381 (8.1)	411 (9.5)	1029 (11.4)

short-term shock. Among these four countries, however, the South Korean recovery is weak and can be taken as the start of a long-term decline in the rate of growth. In this table, forecasting essentially lower growth rates the more developed the country, and higher growth rates the less developed the country. This situation can be also seen as a process of growth rate decline in a South Korea that represents a quasi-developed country.

In addition, table 1 shows that every Asian currency will rise in the long run except for the Indonesian and Taiwanese currencies. There is a possibility that such a trend in the future will not happen by the strengthening of these currencies but by the long term falling of the dollar's value. It is because US trade deficits will not become better according to our projection (not shown). Now, US accumulated deficits have become around 1.5 trillion, and it means the US has to gain 75 billion dollar every year to keep its deficit level, if interest rate is 5 percent. Because the US is regularly gaining mint revenue of about 20 billion dollars every year, necessary trade surplus is about 55 billion dollars. However, this amount is also too large for the US to gain in a few years. In this sense, the US cannot avoid its state bankruptcy followed by a sudden fall of the US dollar.

In sum, the current crisis does not appear to be fundamental or long-term, with some exceptions. They are correctly viewed as an adjustment of exchange rates divergent from the "fundamentals", and they should not be seized upon as evidence of essential weakness in the Asian economies (see Sachs(1997) and Radelet & Sachs (1997)).

III Capital Flight-related Simulation

While the foregoing explanation shows that the current "crisis" is basically not irreversible in Asian developing economies, our model also allows one other extremely interesting simulation. Results are shown in Table 3, and these indicate how a

Table 3: International Affects of Other Countries' Productivity Schock

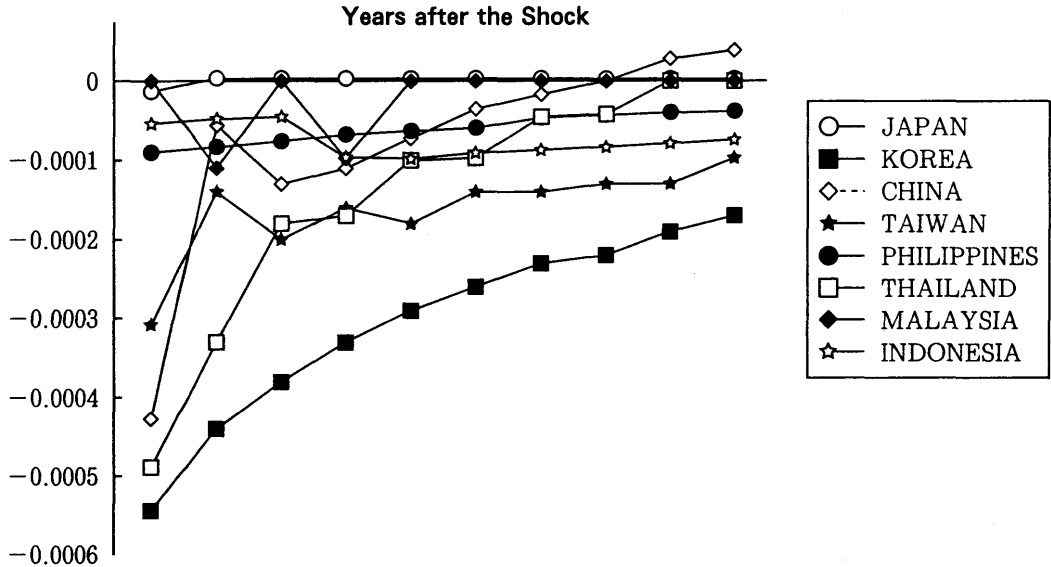| | | Schock Sustaining Countries | | | | | | | | | |
		USA	JPN	KRA	CHN	TWN	PHL	THI	MLS	IND	AUS
Original Effect in	USA		+	−	−	−	−	−	−	−	−
	JAPAN	+		+	+	+	−	+	0	−	+
	KOREA	+	+		−	−	−	−	−	−	+
	CHINA	−	+	+		−	−	−	−	−	−
	TAIWAN	−	−	+	−		−	−	−	−	−
	PHILIPPINES	−	+	+	−	−		−	−	−	−
	THAILAND	−	+	−	−	−	−		−	−	−
	MALAYSIA	−	−	+	−	−	−	−		−	−
	INDONESIA	−	−	+	−	−	−	−	−		−
	AUSTRALIA	+	+	+	−	−	−	−	−	−	

Figure 3: Effects of the Increase in the US Productivity on the Other Countries' GDP

macroeconomic increase in productivity in the economies in the left column would af-
fect total production in the economies in the top row. For each of the ten economies,
Table 3 indicates the +/- directions of the effect of such increased productivity, and
among these, note should be taken of the effect of the U.S. on other economies in the top
row.

Specifically, many negative effects are shown for every economy other than Ja-
pan, meaning that increased productivity in the U.S. raises its profit, which attracts a
flow of capital to the U.S. Recent economic conditions in the U.S. are naturally inter-
preted as "increased productivity" in some sense, and this evokes a causal relationship
in which such increased productivity triggered the crises in Thailand and South Korea,
pulling back its capital from these countries. Multi-country econometric models allow-
ing a direct simulation of such international capital movements in Asian developing
countries are extremely limited. Apart from our model, there is only that of Takenaka,
et al. (1986), but this model is extremely old, leaving only our model. This is the reason
for carrying out such a simulation here.

In addition to a simple +/- indication of U.S.-induced effects on the GDPs of the
eight other Asian economies, more interesting results describing the extent and course
of the effects can also be obtained. Results are shown in Figure 3 and indicate a course
of the effect of a US $100 billion (1995 value) increase in productivity in the U.S. in
1994.

A close examination of these results reveals a very interesting fact that in the
initial period, the negative effects are greatest on South Korea and Thailand. This is
because the capital outflow phenomenon at the start of the crisis was the most pro-
nounced in these two countries. Also of great interest is the fact that while an initially
large negative effect on China later shifts to a positive effect. This would seem to

reflect fundamental growth potential in China.

One other interesting fact in a comparison of these event patterns is that the negative effect on Thailand and the negative effect on Taiwan are opposites in terms of early versus late periods. This indicates that recovery is more rapid in Thailand, or perhaps that the fundamental growth potential in Taiwan is weaker than Thailand. It is also possible that the Thai crisis is affected by deficiencies in policy and is not helped in this respect, but it is in any event interesting that after the fifth year in the figure, the largest negative effects are seen in the semi-advanced economies of South Korea and Taiwan. Long-term global conditions of overall "convergence" illustrate that growth rates are essentially lower the more developed the economy, and the results may also reflect such latent growth rate levels.

In addition, the Japanese pathway in this figure deserves comment because it is quite different from that of the other advanced or semi-advanced economies. This difference seems to stem from Japanese financial independence from US finance. With regard to the US, Japan is a capital-exporting country, not a capital-importing country.

In sum, it has been shown that the ASEAN country crisis will not continue for an extended period, that the South Korean crisis should be seen as part of an overall process of growth rate decline, and that the capital flight inciting these crisis may be related to a temporary increase in productivity in the U.S.

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