Thai Meltdown and Transmission of Recession within ASEAN4 and NIE4

Tilak Abeysinghe
Department of Economics
National University of Singapore
10 Kent Ridge Crescent
Singapore 119260

Email: tilakabey@nus.edu.sg
Fax: (65) 775 2646

September 1999
Revised version: August 2000

ABSTRACT

Using a VARX model that is capable of transforming a trade matrix to output multipliers, this paper investigates how the recessionary impulses generated by the Asian financial crisis are transmitted across borders. The basic transmission channel is the trade links and the contagion shocks can be administered through variables like real exchange rate and credit flows. The real exchange rate effect is examined through two measures, relative consumer price index and relative unit labor cost. The results suggest that real appreciation cannot be considered a cause of the Asian crisis and it contributes very little in the process of transmission of recession. The impact of the credit crunch brought about by the currency crash and capital outflow is examined through indirect means. The evidence presented in the paper suggests that although transmission plays an important role in the medium run, the immediate economic contractions are largely a result of direct shocks that are attributable to "pure contagion".

I would like to thank Rajaguru Gulasekaran for his excellent research assistance. My thanks are also due to Pradumna Rana and the participants of the "Contagion Conference" for their comments on the paper. The financial support provided by Wider, World Bank, IMF and ADB is greatly appreciated.

1. Introduction

The Asian crisis caught every one off guard. Some were stunned by disbelief. "Whither the Asian *cats*?" was the response of some others. The crisis that started with the collapse of the Thai baht on July 2, 1997 sounded the beacon of the end of the Asian miracle, at least apparently so. The currency crisis gave way to a much bigger economic and socio-political crisis.

The crisis also brought the economics profession under attack because no body predicted it[1]. The credit rating agencies went on to rate these economies highly until the onset of the crisis. Growth forecasts by IMF, World Bank, ADB and other institutions gave no indication of a crisis. After the Mexican crisis in 1994, there have been a number of attempts to develop techniques to predict crises and to provide some leading indicators (see Berg and Pattillo, 1999, for a survey). Unfortunately "crisis predictions", like many other economic predictions, tend to be self-defeating. Unlike predicting natural events like earthquakes, solar eclipses, meteor showers or whether changes, economic predictions involve active observers, the economic agents, whose reactions to the prediction invalidate the prediction.

Even though the crisis-prediction is a difficult task because of the endogeneity of the predictions, understanding the causes of the crisis provides valuable information to policymakers in the restructuring process that may help reduce the probability of another crisis. There is already a sizable literature on the causes of the Asian crisis[2]. Broadly speaking the views expressed on the causes fall into two camps, the

[1] The only clear warning that can be traced is by Park in September 1996. Unfortunately this warning remained unnoticed until after the crisis.

[2] See among others IMF (1998, 1999), ADB (1998, 1999), Radelet and Sachs (1998), Goldstein (1998), Kaminsky and Schmukler (1999).

fundamentalists who argue, “it was your fault” and a wide spectrum of others who put the blame on the inherent instability of the international financial system.

The fundamentalists argue that the structural weaknesses or the fault lines that were buried under the rosy surface of the Asian economies were the prime culprits of the crisis. These arguments vary from pure economic causes to Asian values. It is interesting to see how the very Asian values that were regarded the driving force of the Asian success are now alleged to have created the Asian brand of capitalism that is rife with “corruption, cronyism, and nepotism”.

One important shortcoming of many of these studies is that no one so far has engaged in a systematic examination of the alleged causes to pin down the Asian causes of the crisis that are different from the common causes of financial crises. When looked at each cause in isolation, one may find some correlation but in a holistic framework these correlations may disappear. For example, a number of studies cite the slowing of export growth in these economies in 1996 as a sign of surfacing of structural weaknesses. An analysis of electronics demand cycle in Abeysinghe (1996) indicates, however, that the 1996 slowing down was very much due to the interplay of an electronic cycle within the region and not a result of a structural weakness. In fact, even the rapid recovery has a lot to do with the upturn in the electronics cycle.

Whatever be the weaknesses of the Asian economies as alleged by “fundamentalists”, a fairly large group of economists argue that the “instability and asymmetry” of the

global financial system was the prime cause of the Asian crisis[3]. The instability is a part of the capital market, which is subject to panic runs that logic cannot explain. The asymmetry comes from the way the capital market is organized. The global financial system is basically made up of a center and periphery, the center being represented by developed market economies. The impact of capital flows between the center and periphery is asymmetric. The rules of the game are laid in favor of the center. In bad times it is the periphery that ends up suffering. The justification for free international trade in goods and services comes from the theory of comparative advantages. But the same theory cannot be extended to free capital mobility to argue that every one gains. Those who hold this view demand for restructuring the global financial system.

The preceding discussion is not meant to be comprehensive as the main objective of this paper is different. The objective of this paper is to provide another angle to the understanding of the Asian crisis, that is, to examine how the recessionary impulses generated by the financial contagion or otherwise are transmitted across borders[4]. Although "pure contagion" can take place between two unrelated or weakly related economies, further transmission of recessionary shocks generated by the contagion has to take place through the existing economic links. If two economies were unrelated the impact of "pure contagion" would simply create localized recessions. The economies that are closely linked, however, have to withstand both direct and indirect contractionary pressures created by the contagion. Our analysis tries to shed

[3] Ironically this is also the view held by the financier George Soros (1998) who rightly or wrongly had to bear the blame for the Asian crisis. The academics Radelet and Sachs (1999) also hold the view that fundamentals cannot explain the Asian crisis. Jugdish Bhagwati's (1998) well-known write-up in *Foreign Affairs*, "The Capital Myth", is a lucid example of the "non-fundamentalist" view.

[4] As pointed out in the ADB report (1998, p.24, Box 1.4) "the mechanism of transmission remains largely unexplained."

some light on the nature of the Asian contagion by examining output multipliers associated with shocks generated by the contagion.

The economies are linked through a number of channels such as trade, finance and employment. Among these, trade links are the most common and easy to examine because of the availability of data. Glick and Rose (1999) also emphasise the importance of trade links in a study that examines the regional nature of contagion. In fact, they find that other macroeconomic variables cannot explain the regional contagion. As pointed out in Abeysinghe (1999), however, direct trade links tell only a part of the story. One has to account for both direct and indirect effects to obtain an assessment how a shock originated in one economy is transmitted to another. Abeysinghe (1999) has developed a model that can convert a trade matrix to a matrix of multipliers. In this exercise, we extend the model to derive output multipliers associated with some variables that were the direct hits of the contagion. We confine our analysis to eight Asian countries, ASEAN4 (Malaysia, Indonesia, Thailand, Philippines) and NIE4 (Singapore, Hong Kong, South Korea, Taiwan). At times we refer to these countries as Asian8.

2. Methodology

To examine the behavior of output multipliers associated with contagion-afflicted variables, we use a VARX model derived in Abeysinghe (1999). Using reduced form bilateral export functions, Abeysinghe derived the following model to capture the inter-linkages of gross domestic products of different economies.

$$(B_0 * W_t)y_t = \lambda + \sum_{j=1}^{p}(B_j * W_{t-j})y_{t-j} + \sum_{j=0}^{p}\Gamma_{1j}z^*_{1t-j} + \ldots + \sum_{j=0}^{p}\Gamma_{kj}z^*_{kt-j} + \varepsilon_t \qquad (1)$$

where y_t is an (nx1) vector of GDP growth series (n=8 in our case), z_i^* ($i=1,\ldots,k$) are (nx1) vectors of growth rates of exogenous variables, W_t is a known matrix of weights, B's and Γ's are unknown parameter matrices and ε_t is a random vector with zero mean and Var(ε_t) = Ω. The asterisk indicates the element-wise (Hadamard) product of the two matrices.

The main feature of model (1) is that it links the real economies represented by GDP through trade links. The trade links are captured in W_t matrix, which is derived from bilateral export shares[5]. The weight w_{ij} represents the export share of country i with country j such that $w_{ij} = 1$ ($j=1,2,\ldots,n-1;\ i \neq j$). Compared to standard VARX models, model (1) is highly parsimonious. To show the structure of the parameter matrices we present below the basic matrices for n=3 and p=1:

$$\mathrm{B}_0 = \begin{vmatrix} 1 & -\beta_{01} & -\beta_{01} \\ -\beta_{02} & 1 & -\beta_{02} \\ -\beta_{03} & -\beta_{03} & 1 \end{vmatrix},\ B_1 = \begin{pmatrix} \phi_{11} & \beta_{11} & \beta_{11} \\ \beta_{12} & \phi_{12} & \beta_{12} \\ \beta_{13} & \beta_{13} & \phi_{13} \end{pmatrix},\ W = \begin{vmatrix} 1 & w_{12} & w_{13} \\ w_{21} & 1 & w_{23} \\ w_{31} & w_{32} & 1 \end{vmatrix}.$$

The Γ matrices are diagonal. Thus for n=8 the number of parameters of the (8x8) matrices in (1) are: 8 in B_0, 16 in each B_j and 8 in each Γ_k. Note that the effective parameter matrices are given by (B_j*W_t), $j=0,1,\ldots,p$ which consists of 64 parameters as in standard VAR models. Since W_t changes over time the model entails a changing

[5] Since we consider bilateral exports there is no need to consider imports separately.

parameter structure. As shown in Abeysinghe (1999), changing W_t tends to make the basic parameters stable even during the depth of the crisis. This is an important feature of the model that makes it useful for making general inferences. If the parameters of a model change during a crisis, as is usually the case, then such models are of little use in making inferences about the crisis. Another important feature is that since W_t is changing over time the model can generate pre-and post-crisis impulse responses by choosing appropriate W matrices.

The exogenous variables enter the model either through the export function or through the other components of GDP. In this exercise, we consider three vectors of exogenous variables. The first is the export-weighted GDP growth rates of China, Japan, USA, and the rest of the OECD group. We denote this variable by $y_t^* = (y_{1t}^*, ..., y_{8t}^*)'$. This is an important control variable in the model. It basically controls for the third party influence on trade and other economic links.

The other two variables we want to consider are the variables (among others) that played havoc in the region during the crisis. The first is the exchange rate and the second is the foreign capital inflow. These two variables played highly correlated roles during the Asian crisis. Within our framework, the transmission of both shocks takes place through the trade links. Consider, for example, Thailand and Malaysia. With the fall of Thai baht came the credit crunch propelled by un-hedged external liabilities and concomitant capital outflows. While the credit crunch, and also the gloomy economic outlook, reduces the demand for imports from Malaysia, the

devalued baht makes Thai exports more attractive to Malaysians[6]. This puts pressure on the Malaysian currency and becomes a target of a speculative attack. Obviously, during the Asian crisis, panic played a much bigger role than the channel described above. The credit crunch and currency devaluation, however, are likely to work through trade channels much longer aggravating the impact of initial panic shocks.

For the exchange rate, we use an export weighted real exchange rate measure and denote this vector by $R_t = (R_{1t},...,R_{8t})'$. We denote the foreign capital inflow variable by the vector $K_t = (K_{1t},...,K_{8t})'$. With these variables model (1) can be written compactly as

$$B^w(L)y_t = \lambda + \Gamma^{y^*}(L)y_t^* + \Gamma^R(L)R_t + \Gamma^K(L)K_t + \varepsilon_t \qquad (2)$$

where $B^w(L) = (B_0 * W_t) - (B_1 * W_t)L - ... - (B_p * W_t)L^p$, and $\Gamma^i = \Gamma_0^i + \Gamma_1^i L + ... + \Gamma_p^i L^p$, $i = y^*, R, K$.

Note that it is logical and conserves degrees of freedom if we estimate (2) by absorbing $\Gamma^{y^*}(L)y_t^*$ into $B^w(L)y_t$. This entails redefining $B^w(L)$ as an (8×12) matrix and y_t as a (12×1) vector. This means that W_t is also (8×12) such that export shares along the rows sum to unity. After estimating the model, the (8×8) $B^w(L)$ and $\Gamma^{y^*}(L)$ can easily be separated out.

[6] The gains from the devaluation can be realized only if the exporters could continue to produce. The credit crunch, however, can bring the production lines to a halt.

With the above specification the impulse responses with respect to *R* and *K* can be worked out from $B^w(L)^{-1}\Gamma^R(L)$ and $B^w(L)^{-1}\Gamma^K(L)$ respectively. Note that the impulse responses derived from model (2) change over time as the trading pattern changes (i.e. as W_t changes). In our exercise, we use twelve-quarter moving average of export shares as weights (see Abeysinghe, 1999, for details). As a result the weights change slowly over time and we can use a fixed *W* matrix to derive impulse responses, which are meaningful for about another three years.

3. Data

Notwithstanding the parsimony of our model, it is, unfortunately, highly data intensive. To implement the model in (2), we need time series data on 12 GDP series (8 for the Asian8 and 4 for China, Japan, US, and rest of OECD), 88 bilateral export series, 8 real exchange rate series, and 8 capital inflow series. To compute real exchange rate and to deflate capital inflows, we need additional data on price series. As measures of real exchange rate, we use relative CPI and relative unit labor cost. The latter needs further data on wages and employment by country. To make the matters worse, we need at least quarterly data to make any useful inferences about the contagion.

Because of extreme data limitations, we were not able to estimate the full model (2). Quarterly data on capital inflows are not available. As a proxy, we could use domestic private credit available in IFS. Even for this, the Philippines series is available with gaps. The Hong Kong and Taiwan series that we obtained from domestic sources start from 1994q1 and 1987q1 respectively. Because of these limitations we have resorted to an indirect method to assess the impact of the capital flow variable.

We faced enormous difficulties in the computation of unit labor cost (ULC) as well, especially for the ASEAN4. The only country in our list that provides a quarterly ULC index is Singapore. For others we derived ULC by dividing labor cost of manufacturing sector by GDP, labor cost is taken to be the average wage rate times employment[7]. For Thailand, Indonesia and the Philippines we had to interpolate quarterly figures from annual figures (see Data Appendix). For Hong Kong, quarterly wage and employment data are available only from 1983q1 onwards. Based on data availability, our sample covers the period 1983q1-1998q2.

4. Results

4.1 Real Exchange Rate

The most common measure of real exchange rate is relative CPI (RCPI) expressed in one currency. Perhaps a better indicator of competitiveness is the relative unit labor cost (RULC) expressed in one currency (Boltho, 1996). If data were available, relative unit business cost would be even better (Abeysinghe, 1998). The RULC between two countries is the ratio of their unit labor costs (ULC) expressed in US dollars. Therefore, the growth rate of RULC of country *i* against country *j* is simply $R\dot{U}LC_i = (U\dot{L}C_i^{nc} - U\dot{L}C_j^{nc}) - (\dot{E}_i - \dot{E}_j)$, where a dot over the variable indicates growth rate, *nc* indicates "in national currency" and *E* is exchange rate expressed as national currency units per US dollar. Export weighted average of the growth rates of RULC against the other seven Asian countries provide an aggregate measure of RULC for the *i*th country.

[7] ULC by definition is nominal wage rate adjusted for labour productivity. We used both GDP and manufacturing value added in the computation of ULC. This had little effect on RULC.

Figure 1 shows export weighted[8] RCPI and RULC measures for the eight countries. Although both measures show similar turning points, the real appreciation indicated by the two measures could be very different. For example, for Malaysia, RULC indicates a real appreciation since 1993 until 1997q2 while RCPI remains rather flat during this period. For Singapore, the reverse occurs, while RCPI indicates a real appreciation during the same period, RULC remains rather flat. Taiwan, the only country that withstood the pressure of the Asian crisis, is the most noteworthy case, both the RULC and RCPI indicate steady gain in competitiveness in the 1990s.

==========

Figure 1 here

==========

Table 1 shows the average annual rates of change of RULC and RCPI for the pre-crisis period 1993q1-1997q2 and the crisis period 1997q3-1998q2. Observe the contrasting information conveyed by the two measures. During the pre-crisis period, RULC indicates that all NIE4 gained some competitiveness while ASEAN4 lost. This is primarily because ASEAN4 experienced faster growth in wages compared to NIE4. The message contained in RCPI is rather mixed.

Table 1 shows that during the crisis period both measures are in agreement though the magnitude of the numbers are different. If we take RULC as the correct indicator of competitiveness, for Malaysia, RCPI exaggerates the gain in competitiveness whereas for South Korea it understates the gain. Singapore and Hong Kong are the countries that really lost competitiveness during the crisis.

[8] We take geometric average so that the growth rate of the index is the arithmetic average of the

==========

Table 1 here

==========

To examine the output multipliers associated with a 1% real depreciation, we estimated model (2), without the K vector, by setting the lag order p=4.[9] We used both RCPI and RULC in separate runs. By and large both variables remain statistically insignificant or carry the wrong sign in the regressions[10]. Only Singapore and Taiwan regressions produced the correct sign (sum of the five coefficients negative) in both RULC and RCPI regressions.

Figure 2 shows the output multipliers[11] of Singapore in response to a 1% real depreciation of each currency (not simultaneously). These multipliers tell the usual story that a depreciation of Singapore dollar, holding others constant, brings about positive gains to Singapore while a depreciation of each other currency, in general, brings about negative effects on Singapore.

==========

Figure 2 here

==========

growth rates of the individual components.

[9] Although we use seasonally adjusted data, we find some seasonal effect still left in the data and chose p=4 to account for this effect. Unfortunately this leads to a substantial loss of degrees of freedom.

[10] Although the eight equations in model (2) must be estimated by a system method such as 3SLS we used OLS because of the degrees of freedom problem. In small samples the accumulated estimation error of 3SLS may outweigh the gains over OLS.

Largely negligible effects of the real exchange rate indicate that the real exchange rate has not been a significant determinant of their growth process. Although our estimates are less sensitive to whether we include the crisis period in the sample or not, the crisis has done a realignment of the competitive structure in the region as seen in Table 1. It seems, however, that the real appreciation has not been a primary cause of the Asian crisis as believed by some quarters.

4.2 Credit Crunch and Negative Shocks

As we argued earlier, the countries affected by the crisis were not able to realize the gains from devaluation because of the credit crunch. Although we do not have the data pertaining to capital inflows (outflows) and credit crunch, we can use our model to derive output multipliers associated with negative shocks. Unlike devaluation, which is a positive shock to the devaluing country and a negative shock to the others, credit crunch is a negative shock to all. We can, therefore, assess the impact of the credit crunch roughly by deriving the multipliers from $B^w(L)^{-1}$. The results are given in Figure 3.

==========

Figure 3 here

==========

Each panel of Figure 3 shows how a negative shock (-1%) originating in any of the countries listed in the chart affect the GDP growth of the country indicated by the chart title. To improve the contrast, the own-multiplier effects, which are relatively

---

[11] Multipliers are the cumulative impulse responses derived from $B^w(L)^{-1}\Gamma^R(L)$ in model (2). The export share matrix, *W*, used in the computation corresponds to 12-quarter moving average of export shares ending at 1998q2.

bigger, are shown on the right hand-side scale. Unfortunately, despite using seasonally adjusted data some graphs still show the presence of seasonal effects.

For easy comparison, Table 2 provides "within (or own) multipliers" and "transmission multipliers". The within multipliers show the effect of a negative shock that hits a country directly and the transmission multipliers show the transmission effect of a (combined) shock originating in the other seven countries in the group. Note that these multipliers take into account both the direct and indirect trade effects. For example, the effect on Malaysia from a negative shock in South Korea depends on both the direct trade links between the two and the indirect links working through the common trading partners of both the countries.

==========

Table 2 here

==========

The multiplier analysis leads us to the following observations. (1) In general, the contractionary effect of a direct negative shock (within multiplier) is much larger than that of a shock originating outside (transmission multiplier). It is worth examining the charts of Figure 3 individually to see the relative importance of the transmission multipliers to each country. (2) Own shock has a much greater impact within a quarter or two and the transmission effect increases only over time. (3) Multipliers start to stabilize after about eight quarters. (4) There are some unusual results that need further examination. For example, the transmission effect of South Korea on others is very small (see Figure 3). The transmission effect on Hong Kong from others is also very small. Part of the reason for this is Hong Kong's increasing dependence on China for trade.

Note that the output multipliers given above summarize the fundamental linkages between these economies. A question that we can raise now is "does financial contagion work through the fundamental linkages?" Our results provide valuable indirect information on this. As we see in Figure 3 and Table 3, the transmission of shocks through fundamentals needs time. But direct shocks impact the economies faster and the impact is larger. The rapidity with which the financial contagion spread from Thailand to the rest of these Asian countries show that there is little time left for shocks to work through fundamental linkages. Moreover, Figure 3 shows that Thailand's fundamental links with the others are rather weak. Yet, these economies plunging into immediate deep recession is a result of direct shocks that are directly associated with "pure contagion". Whether pure contagion is a result of rational or irrational behavior is beyond the scope of this paper. But living and observing through the crisis in Singapore tells me that "pure contagion" is a mixture of both rational and panic behaviors.

5. Conclusion

The VARX model developed in Abeysinghe (1999) enables us to examine how the recessionary shocks created by contagion-afflicted variables such as exchange rate and capital flows spread across borders. The results show that the transmission of recessionary shocks through existing channels takes time whereas the impact of a direct shock is rather quick and large. The speed at which the Asian economies fell one after the other tells us that it was a result of the direct shocks created by "pure contagion" which has very little to do with fundamental linkages. Obviously

fundamental links start playing an important role in the subsequent spread of the recession from one country to another.

Although the primarily transmission channel of the model is trade, the model is flexible enough to capture other links such as financial. A major obstacle to extending the model in these directions is the lack of time series data on bilateral basis. We leave these extensions for future work. In this exercise we did not address the reforms and the recovery process. If the onset of the Asian crisis was a surprise so was the speedy recovery. Whether the speedy recovery was a result of the reform process or a result of pure luck brought about by the upturn in the world electronics demand cycle remains to be investigated. This is what I am currently working on.

Data Sources

Compiling the data for this exercise turned out to be a daunting task especially for the ASEAN4. Many quarterly data series were derived through inaterpolation of annual series using either the Chow-Lin technique (see Abeysinghe, 1998) or the Spline technique in SAS. The Chow-Lin technique uses related series that are observed quarterly and the Spline method is just a univariate technique. Although univariate interpolation is not preferable we do not have much choice. Overall, the data series are subject to estimation errors of various degrees and this obviously affects our results.

A detailed account of how the GDP series of ASEAN4 and China were interpolated is given in Abeysinghe (1999). For this we used the Chow-Lin technique and the interpolated series are of reasonably good quality. There were problems with bilateral export series as well. For example, Singapore's exports to Indonesia are not published. The computational details of export series are also given in Abeysinghe (1999). The GDP and export share data are available from 1978q1.

For this study we needed additional data on domestic private credit (a proxy for foreign capital inflow). The credit data are available in IFS CDROM except for Taiwan. The IFS series for the Philippines is available with some gaps. The Hong Kong credit series start from 1994q1 and Taiwan credit data (obtained from Taiwan Economic Data Center) starts from 1987q1. We are still in the process of building up a complete data set.

The other data we needed were on RULC and RCPI. To compute ULC, wages and employment data (quarterly) were obtained from the following sources: Taiwan: Taiwan Economic Data Center, South Korea: IFS CDROM, Philippines: IFS CDROM, Malaysia: Monthly Manufacturing Statistics (Malaysia), various issues and IFS CDROM, Hong Kong: Hong Kong Monthly Digest of Statistics, various issues, and Singapore: TREND data base (Department of Statistics). Annual data for Indonesia, Thailand and the Philippines were obtained from Yearbook of Labor Statistics (ILO), various issues, supplemented by Central Bank Reports. Annual series were converted quarterly using the Spline technique.

Data on exchange rates and CPI are from IFS CDROM. Taiwan data are from Taiwan Data Center. We also needed industrial production data for various interpolations. These quarterly series were obtained from Quarterly Bulletin, Bank of Thailand, and for Indonesia and the Philippines from Statistical Indicators for Asia and Pacific (Economic Social Commission for Asia and Pacific, UN). The rest is from IFS CDROM.

REFERENCES

Abeysinghe, Tilak. (1996), "Electronics and growth cycles in Singapore", Econometric Studies Unit (National University of Singapore) paper. (Forthcoming in *Applied Economics*).

Abeysinghe, Tilak (1998), "Best linear unbiased disaggregaion of annual GDP to quarterly figures: The case of Malaysia", *Journal of Forecasting*, 17, 527-37.

Abeysinghe, Tilak (1998), "Singapore's cost competitiveness in the region: A technical note on RULC", *Singapore Economic Review*, 43, 12-23.

Abeysinghe, Tilak (1999) "Measuring the contagious effect of the Asian crisis on total production: A structural VAR approach", Working Paper, Department of Economics, National University of Singapore.

Asian Development Bank (1998) *Asian Development Outlook*, Manila: ADB.

Asian Development Bank (1998) *Asian Development Outlook*, Manila: ADB.

Berg, Andrew and Chatherine Pattillo (1999) "Are currency crises predictable? A test", *IMF Staff Papers*, 46, 107-38.

Bhagwathi, Jugdish (1998) "The capital myth", *Foreign Affairs*, 77, 3, 7-12.

Boltho, A. (1996) "The assessment: International competitiveness", *Oxford Review of Economic Policy*, 12, 1-16.

Glick, Reuven and Andrew Rose (1999) "Contagion and trade, why are currency crises regional?" *Journal of International Money and Finance*, 18, 603-17.

Goldstein, Morris (1998) *The Asian Financial Crisis: Causes, cures, and systemic implications*, Washington: Institute for International Economics.

International Monetary Fund (1998) *Asian Economic Outlook*, Washington: IMF.

International Monetary Fund (1999) *Asian Economic Outlook*, Washington: IMF.

Kaminskey, Graciela and Sergio Schmukler (1999) "What triggers market jitters? A chronicle of the Asian crisis", *Journal of International Money and Finance*, 18, 537-60.

Park, Yung Chul, (1996), "East Asian liberalization, bubbles, and the challenge from China", *Brookings Papers on Economic Activity (2)*, 357-71.

Radelet, Steven and Jeffrey Sachs (1998) "The East Asian financial crisis: Diagnosis, remedies, prospects", *Brookings Papers on Economic Activity (1)*, 1-90.

Soros, George (1998) *The Crisis of Global Capitalism: Open Society Engaged*, Little, Brown and Company.

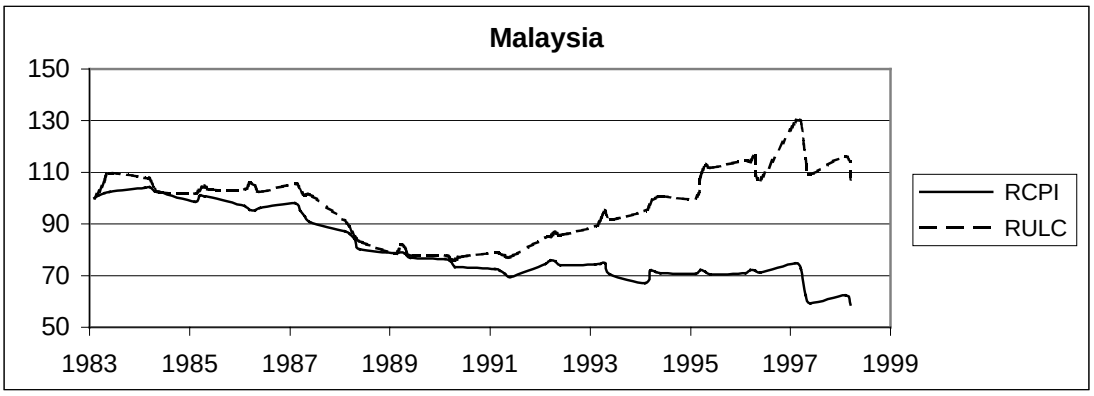
Table 1
Average annual rate of change of RULC and RCPI

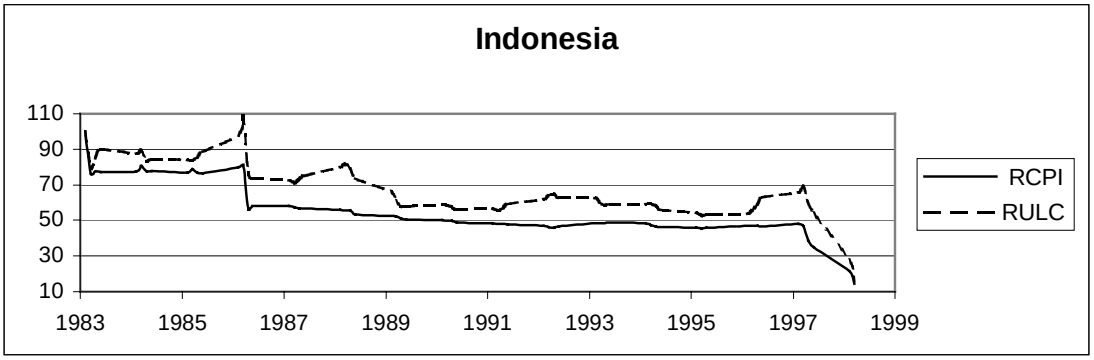
	Malaysia	Indonesia	Thailand	Philippines	Singapore	Hong Kong	S.Korea	Taiwan
93:1-97:2								
RULC	8.0	0.9	3.0	5.6	-2.5	-3.4	-0.4	-4.4
RCPI	-0.7	0.3	-0.4	2.4	0.3	3.0	-2.3	-5.1
97:3-98:2								
RULC	-6.7	-37.0	-16.3	-9.3	15.3	47.0	-27.3	0.3
RCPI	-16.4	-41.6	-18.1	-9.2	20.2	39.8	-13.6	-2.5

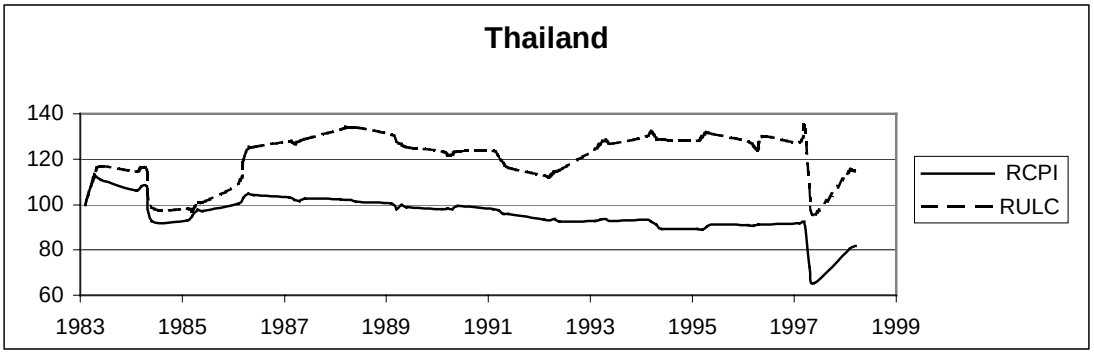
Table 2
Multiplier effects of a negative shock (-1%) on GDP growth

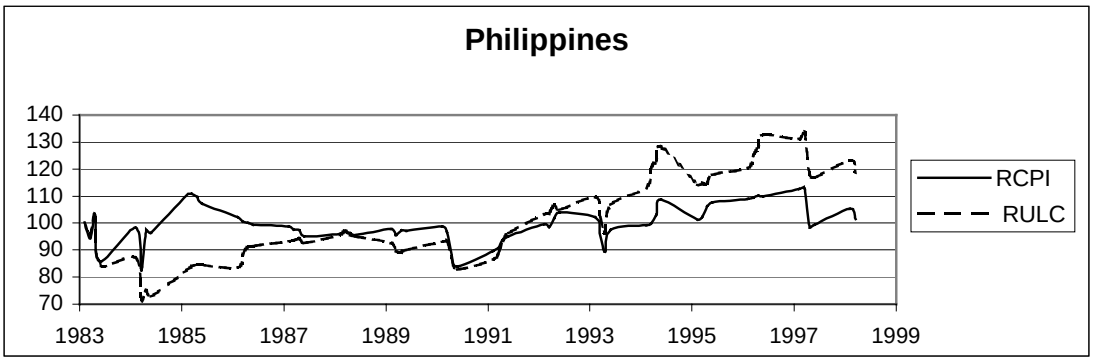
Country	**Source of shock**	**Multipliers over quarters**						
		1	**2**	**4**	**6**	**8**	**10**	**12**
Malaysia	Within	-1.04	-1.00	-1.34	-1.58	-1.70	-1.78	-1.82
	Transmission	-0.33	-0.45	-0.88	-1.00	-1.08	-1.15	-1.17
Indonesia	Within	-1.00	-1.02	-1.24	-1.48	-1.57	-1.64	-1.67
	Transmission	0.04	-0.01	-0.41	-0.64	-0.71	-0.78	-0.86
Thailand	Within	-1.01	-0.93	-0.55	-1.27	-0.78	-1.37	-0.90
	Transmission	-0.20	-0.30	-0.79	-0.88	-1.16	-1.07	-1.33
Philippines	Within	-1.01	-0.93	-0.97	-1.26	-1.29	-1.38	-1.40
	Transmission	-0.45	-0.41	-0.42	-0.57	-0.60	-0.68	-0.67
Singapore	Within	-1.05	-1.27	-1.75	-1.59	-1.64	-1.70	-1.62
	Transmission	-0.71	-0.78	-1.52	-1.73	-1.74	-1.88	-1.90
Hong Kong	Within	-1.01	-0.88	-0.99	-1.12	-1.16	-1.18	-1.19
	Transmission	-0.12	-0.11	-0.11	-0.16	-0.14	-0.15	-0.15
South Korea	Within	-1.02	-0.53	-0.70	-0.52	-0.51	-0.58	-0.56
	Transmission	-0.95	-0.73	-0.93	-1.06	-1.35	-1.44	-1.34
Taiwan	Within	-1.01	-1.42	-1.87	-1.88	-1.90	-1.88	-1.86
	Transmission	-0.34	-0.45	-0.78	-1.13	-1.30	-1.39	-1.41

Note: Transmission multipliers show the impact on the country concerned of a -1% shock in each of the other seven combined.


Malaysia
150
130
110
90
70
50
1983
1985
1987
1989
1991
1993
1995
1997
1999
RCPI
RULC


Indonesia
110
90
70
50
30
10
1983
1985
1987
1989
1991
1993
1995
1997
1999
RCPI
RULC


Thailand
140
120
100
80
60
1983
1985
1987
1989
1991
1993
1995
1997
1999
RCPI
RULC


Philippines
140
130
120
110
100
90
80
70
1983
1985
1987
1989
1991
1993
1995
1997
1999
RCPI
RULC

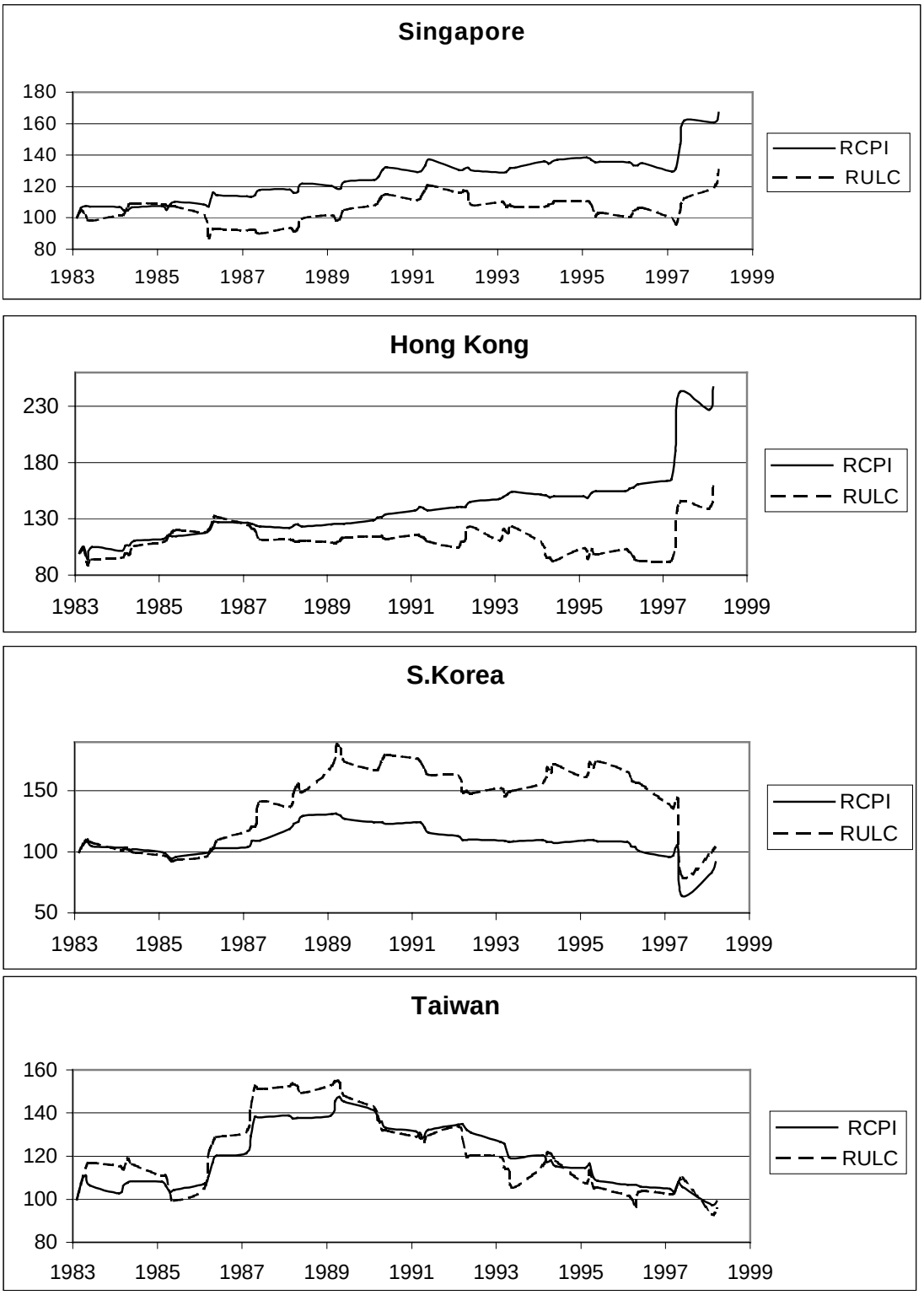


Figure 1. Measures of real effective exchange rate, RCPI and RULC
(1983Q1=100)

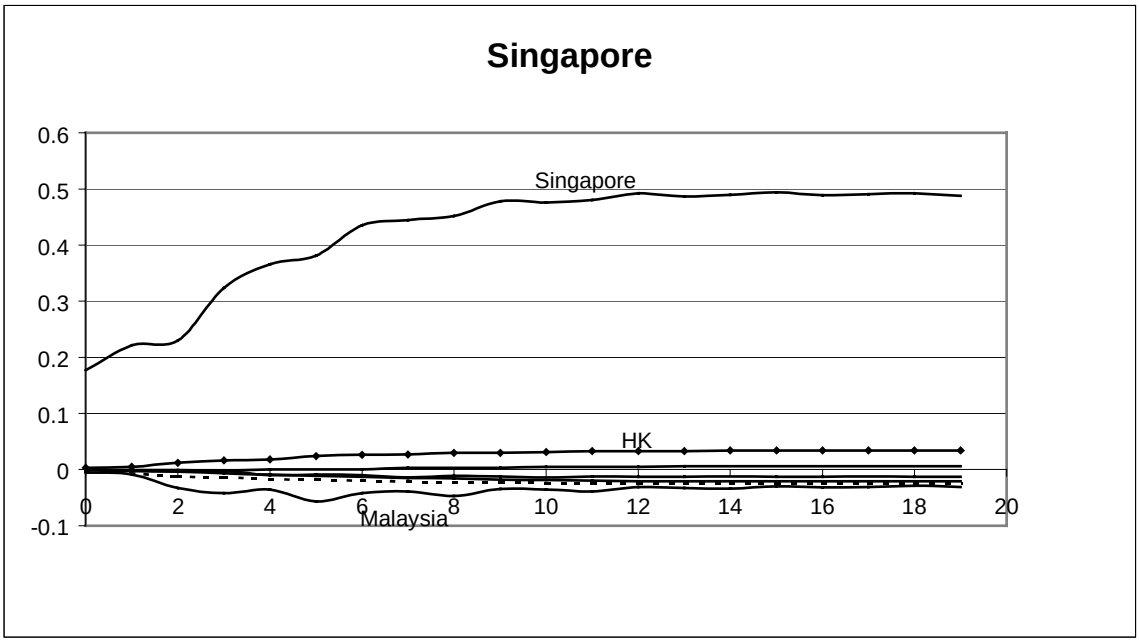
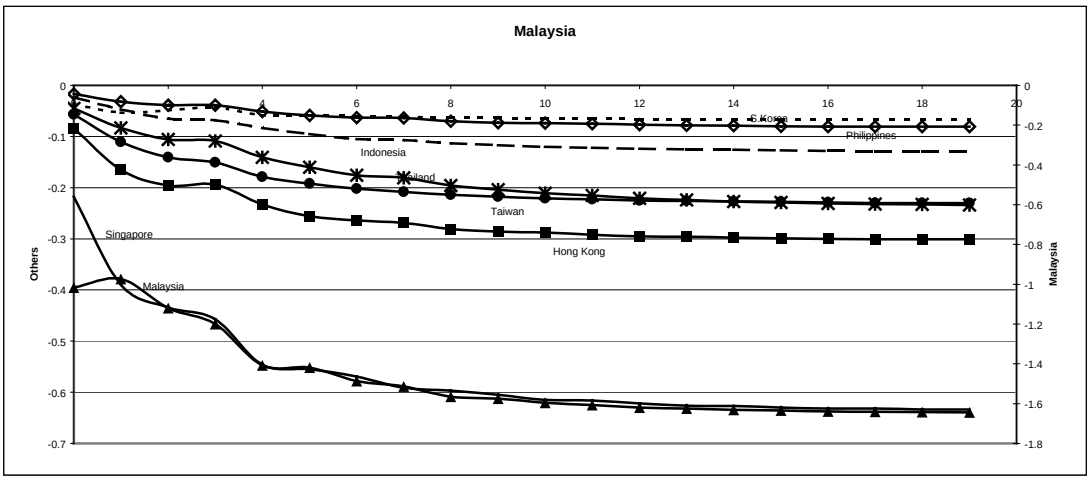
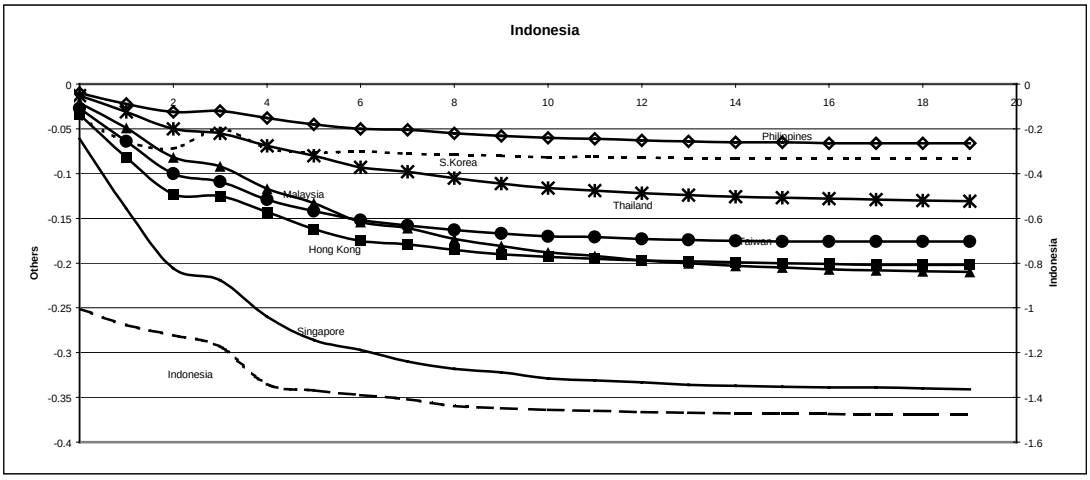
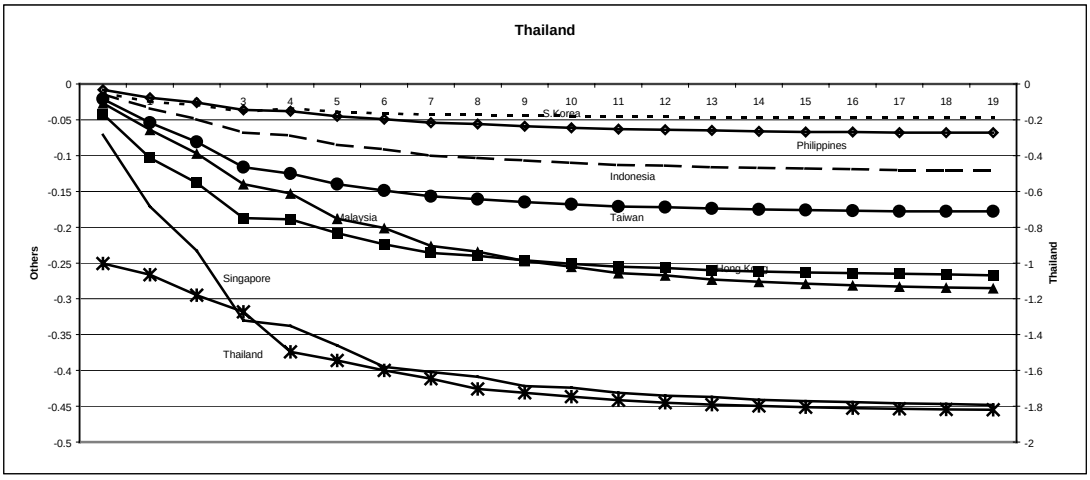
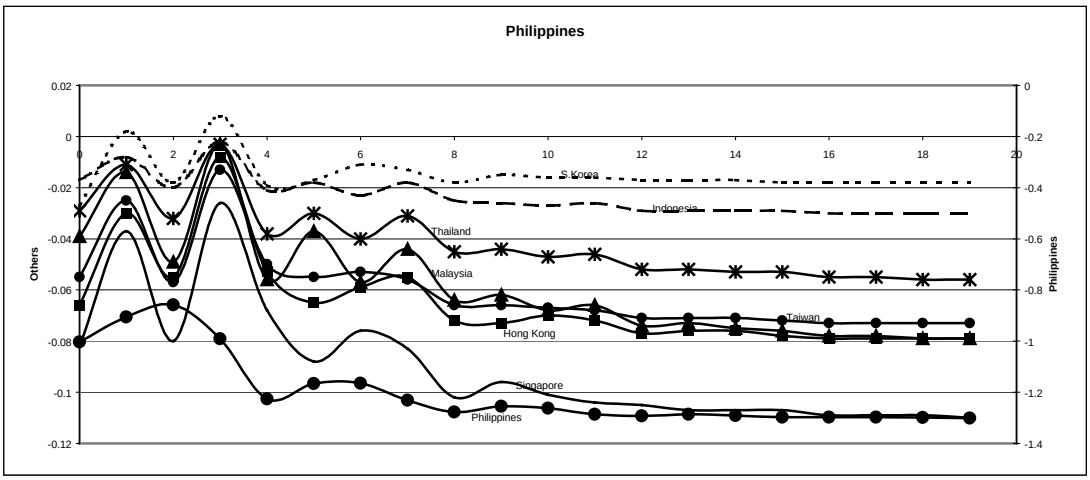


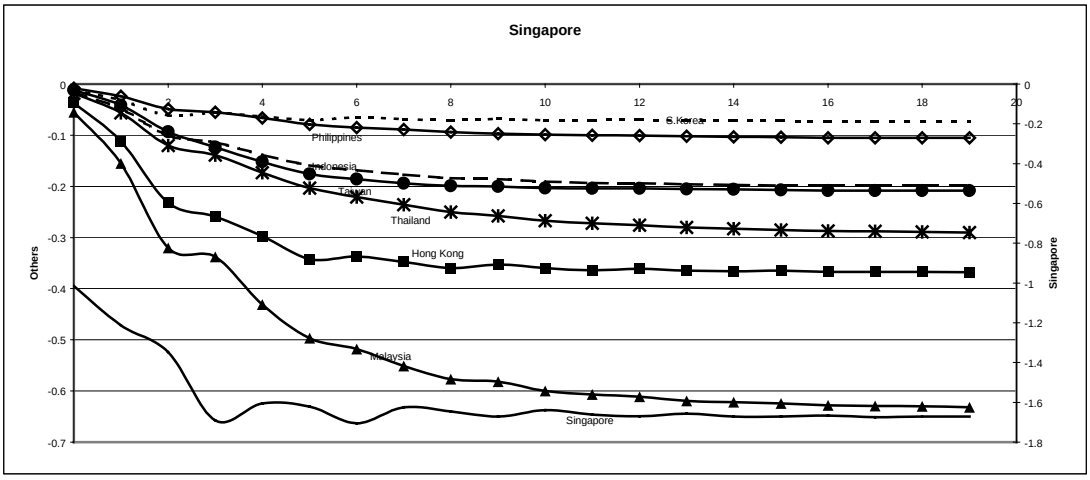
Figure 2. Multiplier effect on Singapore GDP growth from a 1% real depreciation of Singapore currency and the currencies of the other seven in the group

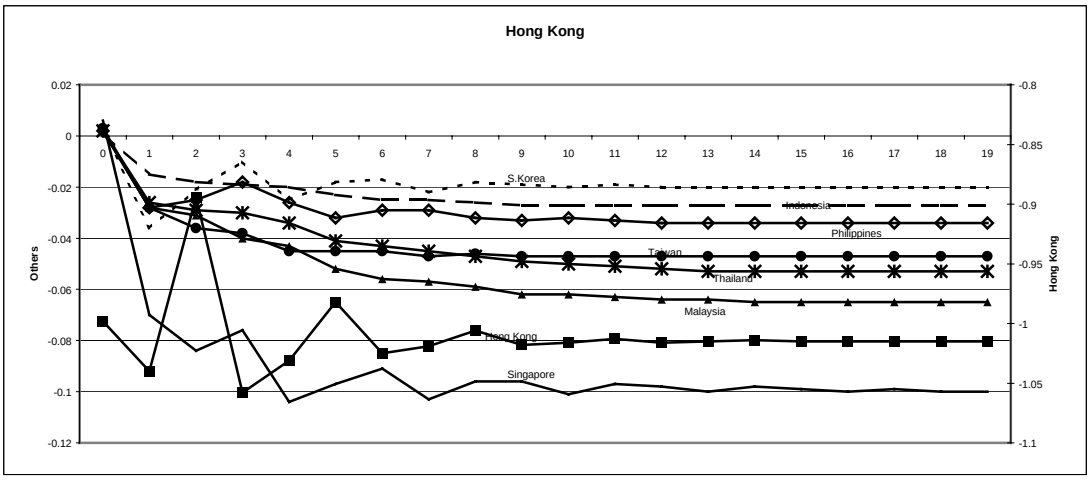

Malaysia
Others
Malaysia
S.Korea
Philippines
Indonesia
Thailand
Taiwan
Hong Kong
Singapore
Malaysia

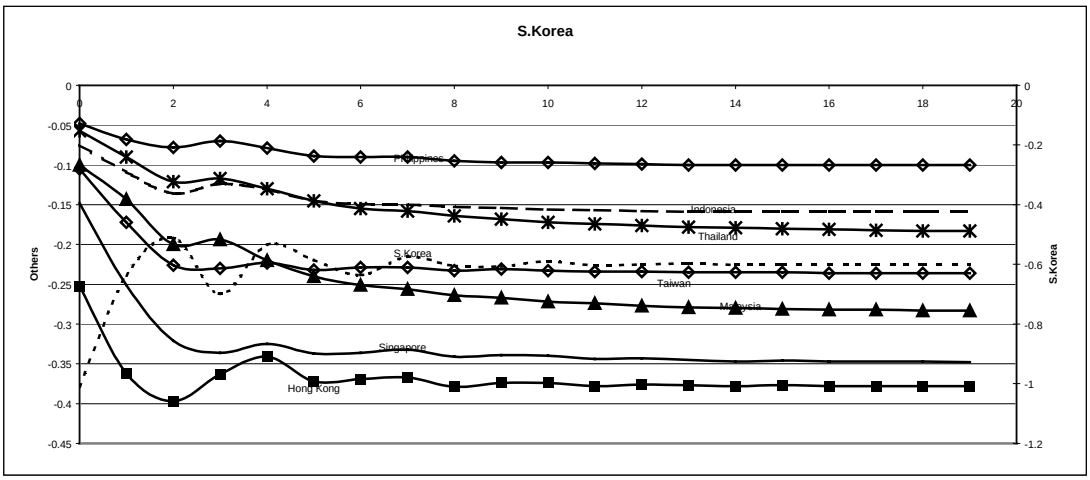

Indonesia
Others
Indonesia
Philippines
S.Korea
Malaysia
Thailand
Hong Kong
Singapore
Indonesia


Thailand
Others
Thailand
S.Korea
Philippines
Indonesia
Malaysia
Taiwan
Singapore
Thailand


Philippines
Others
Philippines
S.Korea
Indonesia
Thailand
Malaysia
Taiwan
Hong Kong
Singapore
Philippines


Singapore
Others
Singapore
S.Korea
Philippines
Indonesia
Taiwan
Thailand
Hong Kong
Malaysia
Singapore


Hong Kong
Others
Hong Kong
S.Korea
Indonesia
Philippines
Taiwan
Thailand
Malaysia
Hong Kong
Singapore



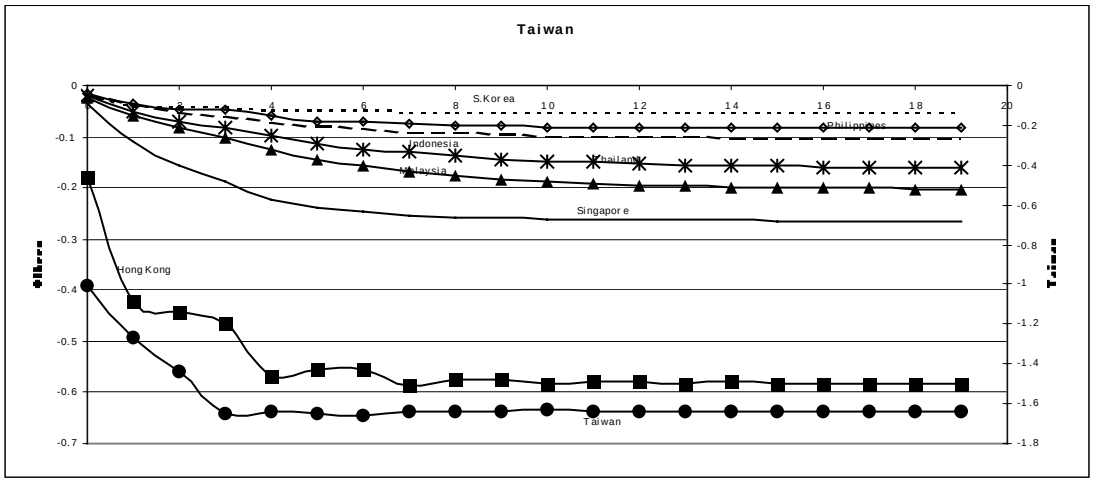


Figure 3. Output multipliers of a negative shock