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Exchange Rate Regimes and Monetary Independence in East Asia

Chang-Jin Kim and Jong-Wha Lee

**KOREA INSTITUTE FOR
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Executive Summary

This paper examines whether changes in exchange rate arrangements have affected monetary independence in East Asian countries after the 1997 Asian crisis. We find that the sensitivity of local to U.S. interest rates has declined for many Asian countries since they adopted floating exchange rate regimes after the crisis. This empirical finding suggests that the choice of exchange rate regime is an important factor for the independence of monetary policy. Floating regimes appear to offer East Asian countries at least some degree of monetary independence after the East Asian crisis

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Exchange Rate Regimes and Monetary Independence in East Asia*

Chang-Jin Kim** and Jong-Wha Lee***

I. Introduction

Since the financial crisis in 1997, East Asian countries have faced many new challenges. One of the most prominent issues is the adoption of an appropriate exchange rate regime and monetary policy under increasing capital market liberalization. Indeed, the regimes selected by the Asian countries in the wake of the regional crisis have varied significantly. Some opted for fixed exchange rate regimes, either in a hard peg currency board system or in a combined form with restrictions on capital flows. Others preferred a freely floating exchange rate regime.

Each regime has its own advantages and disadvantages. Fixing the exchange rate helps to reduce transaction costs and exchange rate risks. It can also work as a credible nominal anchor for monetary

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policy. On the other hand, a floating exchange rate regime allows the domestic monetary authority to pursue an independent monetary policy.

The issue of monetary independence under floating exchange regimes, however, has been a topic of controversy. In theory, under a pegged exchange rate regime with unrestricted capital flows, domestic interest rates cannot be set independently. In contrast, a flexible exchange rate arrangement allows the monetary authority to retain domestic interest rates as a policy instrument. But, alternative views such as the 'fear of floating' theory argue that even if formally floating, countries would not freely move their exchange rates, and thereby actually behave much like they would in a pegged system (Calvo and Reinhart, 2001).

Recent empirical studies—including Frankel (1999), Hausman, Panizza, and Stein (1999), Borensztein, Zettelmeyer, and Philippon (2001), and Frankel, Schmukler and Serven (2002)—formally investigate whether the choice of the currency regime affects monetary policy independence in practice. These studies estimate the sensitivity of local interest rates to changes in international interest rates, examining whether rates are less sensitive to changes under floating exchange rate regimes than under pegged regimes. In principle, under floating regimes, changes in the exchange rates would absorb the effects of international interest rate shocks, and thereby provide "insulation" for domestic interest rates. In the case of East Asian countries, previous studies provide somewhat contrasting results. Borensztein et al. (2001) show that interest rates in Hong Kong, which has a fixed exchange rate regime, react much more to U.S. interest rates than do interest rates in Singapore, which has a floating

exchange rate regime. This finding is consistent with the theoretical prediction. In contrast, Frankel et al. (2002) find that in the long run local interest rates are adjusted fully to international interest rates regardless of the exchange rate regime. For East Asian countries, the estimates of the long-run sensitivity of local interest rates to U.S. interest rates do not statistically differ from the estimates for Hong Kong, Singapore, Thailand, and the Philippines, despite the differences in their exchange regimes.

In this paper, we examine whether the interest rates of East Asian countries react differently to U.S. interest rate shocks according to their different regimes of exchange rates. We focus on eight East Asian economies: Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Thailand. Among them, five countries—Indonesia, Korea, Malaysia, the Philippines, and Thailand—adopted new exchange rate arrangements after the 1997 Asian crisis. We will examine whether the adoption of new exchange rate regimes significantly affected the extent of monetary autonomy in these Asian countries. Our study extends the previous literature in terms of empirical techniques by controlling for the endogeneity of international interest rate shocks. For our empirical investigation of the issue, we employ the Generalized Method of Moments (GMM).

This paper is organized as follows. In Section II, we review changes in exchange rate regimes and monetary policies in East Asia. In Section III, we undertake empirical tests on the sensitivity of domestic interest rates to international interest rates in East Asian economies and interpret the empirical results. Concluding remarks follow in Section IV.

II. Exchange Rate Regime and Monetary Policy in East Asia

1. Changes in Exchange Rate Regimes

This section discusses how exchange regimes have changed in East Asia. The official IMF classifications of exchange rate regimes for East Asian countries are reported in <Appendix Table A>. In addition, <Appendix Table B> shows *de facto* classifications of exchange rate regimes for East Asian countries by Reinhart and Rogoff (2002). The IMF classifications rely exclusively on each government's own declaration of its exchange rate regime. But, there are often contradictions between the exchange rate regime that prevails *de jure* and the way exchange rate policy is conducted *de facto*. For example, a regime that is classified as floating (independently or managed) might be in effect a peg with which the country defends its exchange rate within a narrow margin around a fixed rate. Recent studies such as Levy-Yeyati and Sturzenegger (1999) and Reinhart and Rogoff (2002) highlight the contrast between countries' official declarations concerning their exchange rate regimes and the way they actually conduct exchange rate policy.

Before the 1997 currency crisis, most East Asian economies opted to adopt *de facto* U.S. dollar peg systems for their exchange rate arrangements. The Hong Kong dollar was fixed to the dollar. The Chinese yuan was also been pegged to the U.S. dollar, but with occasional adjustments. The Thai baht and the Malaysian ringgit were similarly stable against the dollar, although these monetary author-

ities officially adopted a multiple currency basket system. Singapore, Korea, and the Philippines also targeted their currencies to the dollar rather loosely by combining discretion and market pressure with varying weights. Indonesia was on a *de facto* crawling peg to the U.S. dollar by sliding the rupiah by several percent per year to offset the inflation gap between home and abroad.

Most of the crisis-affected Asian economies have shifted their exchange rate regimes from *de facto* US dollar pegs to floating ones.¹⁾ The dollar peg system they adopted before the crisis was thought to have contributed to the loss of confidence in their currencies in 1997. On July 2, 1997, Thailand adopted a managed floating exchange rate regime in which the value of the baht was determined by market forces and the Bank of Thailand would intervene in the market, only when it was necessary to avoid excessive volatilities. In July 1998, Thailand moved to substantially greater exchange rate flexibility. Indonesia, Korea, and the Philippines have also moved to floating exchange rate systems since the crisis. In contrast, Malaysia started pegging to the U.S. dollar in September 1998. Hong Kong and China have also kept their currencies pegged to the U.S. dollar.

Both the *de jure* and *de facto* definitions seem to have reflected these exchange regime changes in the post-crisis Asian countries. In fact, for the whole period of the 1990s, they render quite similar classifications of the exchange rate regime for each of the East Asian economies, at least in terms of three broad categories—fixed, intermediate and floating regimes. One exception is the Philippines. The IMF-based classification defines the country's exchange rate regime as

1) See Baig (2001) for a detailed description of exchange rate behavior in East Asia after the crisis.

floating since October 1984, while the *de facto* one categorizes it as intermediate before August 1995, fixed between September 1995 and June 1997, and intermediate from December 1997 until the present.

2. Exchange Rate Regimes and Monetary Policy

With a pegged exchange rate under free capital movements, monetary policy is committed to the single goal of maintaining the exchange rate at its announced level. Therefore, with a peg, the monetary authority conducts interventions in the foreign exchange markets to assure exchange rate stability. For instance, the Hong Kong monetary authority declares the objective of its monetary policy as “maintaining currency stability, within the framework of the linked exchange rate system, through sound management of the Exchange Fund, monetary policy operations and other means deemed necessary.”

Adopting a floating exchange rate allows monetary authorities to use monetary policy for other macroeconomic goals, such as long-term growth, full employment, or price stability. In recent years, price stability has increasingly gained wide acceptance as an appropriate goal of monetary policy.²⁾ Inflation targeting, which can be defined as including a publicly announced, specific range of acceptable inflation rates as an explicit target of monetary policy, has been characterized as an effective way to constrain policymaker’s discretion.

Explicit inflation targeting also became prevalent in East Asia. The Bank of Korea introduced explicit inflation targeting in the context of the post-crisis reforms adopted with the support of the IMF in 1998.

2) See McCauley (2001) and Debelle (2001) for a detailed discussion of post-crisis developments in East Asian monetary policies.

<Table 1> Exchange Rate Arrangements and Anchors of Monetary Policy, March 2001

Exchange rate	Monetary Policy Framework				
	Exchange rate anchor	Monetary aggregate target	Inflation targeting framework	IMF supported or other monetary program	Other
Currency Board Arrangements	Hong Kong				
Other conventional fixed peg arrangements	China* Malaysia	China*			
Managed floating with no predetermined path for the exchange rate					Singapore
Independent floating		Philippines*	Korea Thailand*	Indonesia Philippines* Thailand*	Japan

Sources: IMF, *Annual Report* 2001.

Note: An asterisk indicates that the country adopts more than one nominal anchor in conducting monetary policy. The monetary policy framework indicates:

- 1) Exchange Rate Anchor: The monetary authority stands ready to buy and sell foreign exchange at given quoted rates to maintain the exchange rate within a predetermined range.
- 2) Monetary Aggregate Anchor: The monetary authority uses its instruments to achieve a target growth rate for a monetary aggregate and the targeted aggregate becomes the nominal anchor or intermediate target of the monetary policy.
- 3) Inflation Targeting Framework: A framework in which medium-term numerical targets for inflation are publicly announced with an institutional commitment by the monetary authority to achieve these targets.
- 4) IMF-Supported or Other Monetary Program: An IMF-supported or other monetary program involves the implementation of a monetary and exchange rate policy within the confines of a framework that establishes floors for international reserves and ceilings for net domestic assets of the central bank. As the ceiling on net domestic assets limits increases in reserve money through central bank operations, indicative targets for reserve money may be appended to this system.
- 5) Other: The country has no explicitly stated nominal anchor, but rather monitors various indicators in conducting monetary policy, or there is no relevant information available for the country.

The Bank of Thailand published its first quarterly inflation report in July 2000. Indonesia set its second annual inflation target in January of 2001, and the Philippines is also in the process of adopting inflation targeting.

<Table 1> shows the current monetary policy frameworks that are associated with the exchange rate arrangements in East Asian countries.

III. Empirical Test of Monetary Independence in East Asia

1. Basic Specification of the Model

We focus on the estimation of a simple specification as follows:

$$(1) \quad \Delta r_t^{lc} = \alpha + \beta \Delta r_t^* + \rho \Delta r_{t-1}^{lc} + e_t, \quad e_t \sim (0, \sigma_e^2)$$

Here r_t^{lc} represents the domestic nominal interest rate in the local currency of each country at time t , α is a constant term, r_t^* is the international interest rate, and β is the sensitivity of the local interest rate to foreign rates. This specification takes into account the dynamic adjustment of local interest rates to international interest rate shocks. The speed of adjustment towards the long-run equilibrium is defined by $1 - \rho$, and the long-run adjustment of local interest rates to international interest rate is measured by $\beta/(1 - \rho)$. Due to a failure to reject the null of a unit root for each of the interest rates under investigation we specify the model in the first-differenced interest rates.³⁾

The specification will be estimated for each of the East Asian economies. By comparing the values of β across economies, we can assess whether the choice of the currency regime influences monetary policy independence across East Asian economies. According to the conventional view, more flexible exchange rate regimes allow countries additional room to pursue their independent monetary policies.

3) We test if the local and U.S. interest rates are cointegrated and cannot reject the null hypothesis of no cointegration.

Therefore, the sensitivity of local to international interest rates should increase with the rigidity of the exchange rate regime. In other words, for a given degree of capital mobility, real integration and other factors, we would expect $\beta_{fixed} > \beta_{intermediate} > \beta_{floating}$. In fact, in a fixed exchange rate regime with full capital mobility, β_{fixed} equals 1. In countries with similar exchange rate regimes, the sensitivity of the local interest rate to the foreign rate increases with the degree of capital account liberalization.

But, the adjustment may not occur immediately (within a month). Differences in capital market openness and financial market development can cause heterogeneity in the adjustment dynamics among countries, even under the same exchange rate regimes. In the model, the parameter would capture the country heterogeneity in adjustment speed. We expect that, all other factors being equal, the adjustment speed would be higher (i.e., lower value of ρ) in fixed exchange rate regimes.

The sensitivity of local to international interest rates can also change over time within an economy where the exchange rate regime has changed during the sample period. In the estimation, we divide the sample period into two - sub-periods—before and after the Asian financial crisis—and consider the changes in the exchange rate regimes of the East Asian countries.

2. The Estimation Technique

In the estimation of specification (1), previous studies such as Frankel et al. (2002) assume that the changes in the U.S. interest rates are exogenous, and contemporaneously uncorrelated with the error

term. This assumption can be justified in the sense that the financial markets of East Asian countries are relatively smaller than the U.S. financial market.

However, as Borensztein et al. (2002) point out, this assumption is unlikely to be true. Common shocks that affect both U.S. and domestic interest rates cause a potential endogeneity problem. Since East Asian economies are highly linked to the U.S. in trade, their business cycles tend to become synchronized. Hence, shocks to U.S. activities are likely to affect the outputs of Asian economies, leading to co-movements of U.S. and domestic interest rates. In general, any variables omitted from the specification, which are correlated with U.S. interest rates can cause biased estimates of the sensitivity parameter, β .

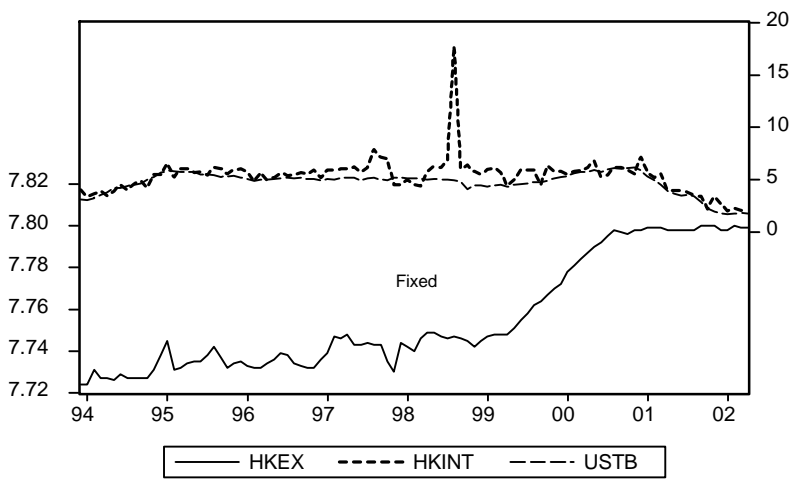
This paper adopts the Generalized Method of Moments (GMM) technique by Hansen (1982) in order to account for such an endogeneity problem as well as heteroscedasticity of unknown form in the disturbance terms. Defining z_t to be a vector of instrumental variables correlated with Δr_t^* but not with e_t , equation (1) implies the following orthogonality conditions:

$$(2) \quad E[(\Delta r_t^l - \alpha - \beta \Delta r_t^* - \rho \Delta r_{t-1}^l) \cdot z_t] = 0$$

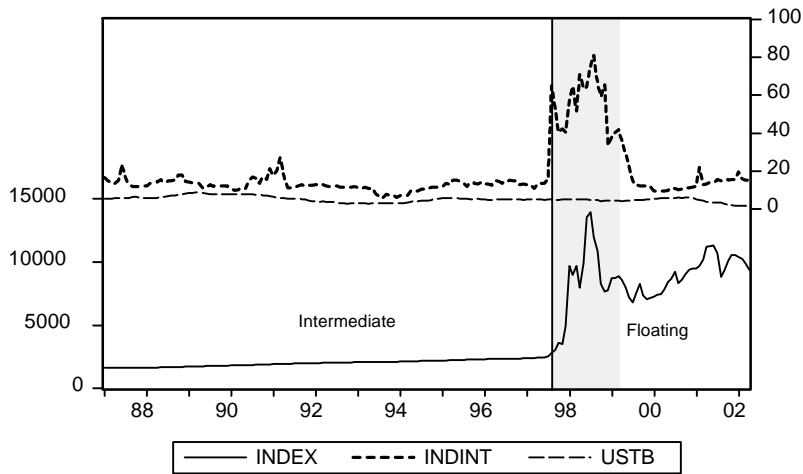
which is used as the basis for the GMM estimation of the parameters of the model. The instrumental variables employed are the four lags of domestic and U.S. interest rates

$$(\Delta r_{t-1}^l, \Delta r_{t-2}^l, \Delta r_{t-3}^l, \Delta r_{t-4}^l, \Delta r_{t-1}^*, \Delta r_{t-2}^*, \Delta r_{t-3}^*, \Delta r_{t-4}^*).$$

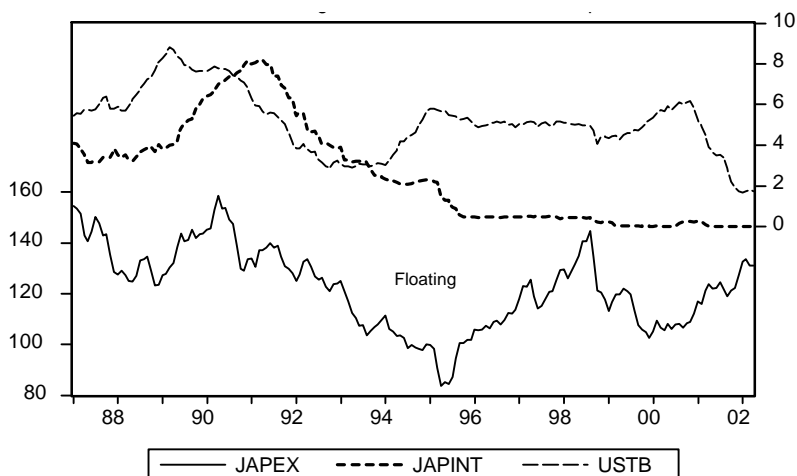
<Figure 1> Exchange rates and interest rates in Hong Kong



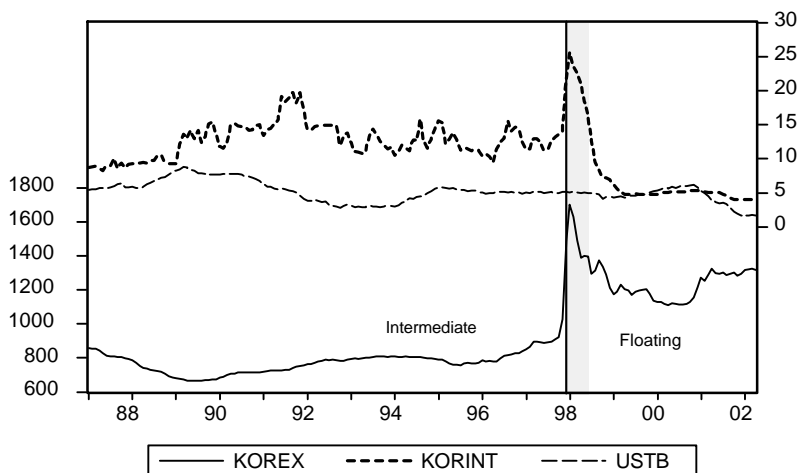
<Figure 2> Exchange rates and interest rates in Indonesia



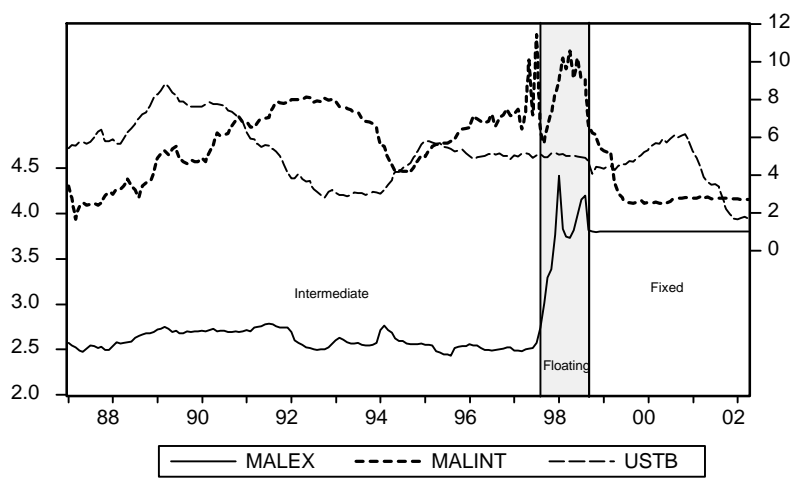
<Figure 3> Exchange rates and interest rates in Japan



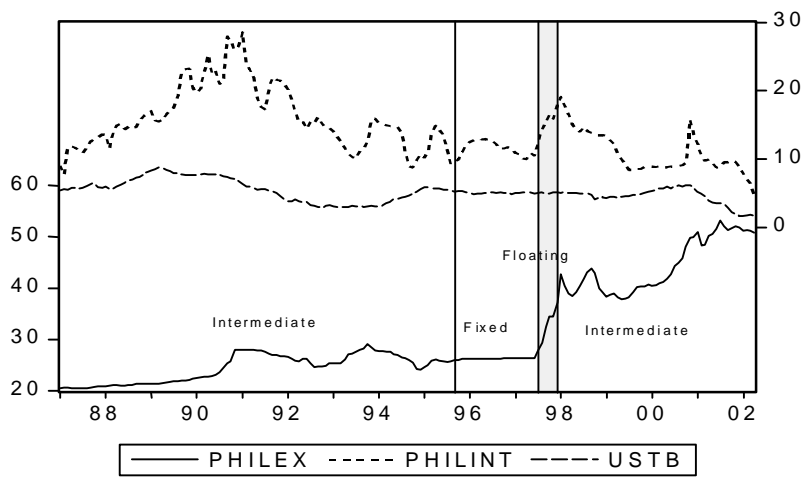
<Figure 4> Exchange rates and interest rates in Korea



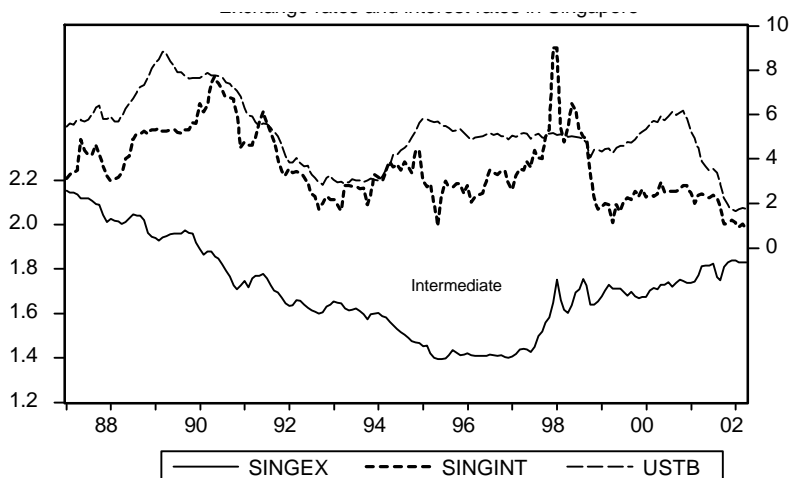
<Figure 5> Exchange rates and interest rates in Malaysia



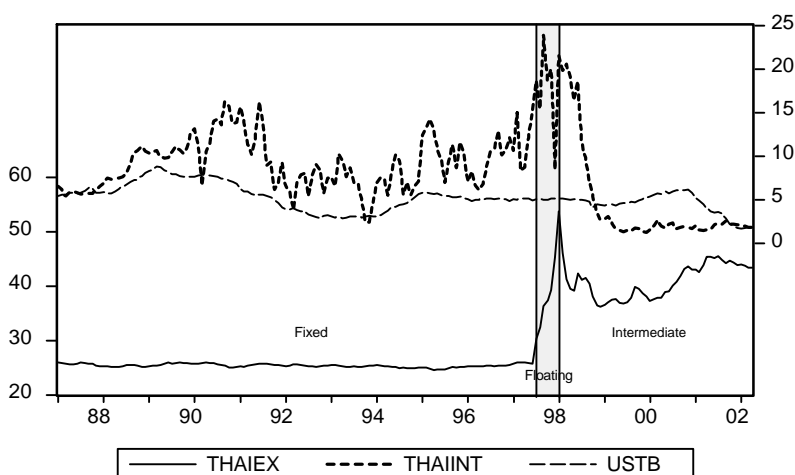
<Figure 6> Exchange rates and interest rates in Philippines



<Figure 7> Exchange rates and interest rates in Singapore



<Figure 8> Exchange rates and interest rates in Thailand



3. Data

Our basic source of interest rate data is the International Monetary Fund (IMF), *International Financial Statistics*. We work with monthly data on 90-day local money market rates. As the international interest rate, we use the 90-day US T-bill rate. We focus on the sample period of January 1987 to April 2002, which is divided into two sub-periods—the pre-crisis period from January 1987 to May 1997, and the post-crisis period from October 1998 to April 2002. We exclude the crisis period, from June 1997 to September 1998, in the estimation.

Figures 1 to 8 plot the movements of the local and international interest rates for each of the eight Asian countries. China is excluded because of the limited availability of local interest rate data. The bilateral exchange rates vis-à-vis the US dollar are also plotted together. In the figures we denote the exchange rate regimes during the sample period. For the exchange regimes, we use *de facto* exchange rate regimes as reported in <Appendix Table B>. The classification shows that there are three countries—Hong Kong, Japan, and Singapore—which have never changed their exchange rate regimes since 1987. The other five countries—Indonesia, Korea, Malaysia, the Philippines, and Thailand—have changed their regimes at least once during the period.

4. Estimation Results

We estimate the dynamic specification (1) separately for each sub-period sample for the eight East Asian countries. <Table 2> presents the estimation results.

<Table 2> The Response of Local to U.S. Interest Rates
A. Countries with one exchange rate regime

Country	Regime	1987. 1~1997. 5				1998. 10~2002. 4			
		Alpha	Beta	Rho	Test for long-run Slope=1	Alpha	Beta	Rho	Test for long-run slope=1
Hong Kong	Fixed	0.05 (0.04)	1.15* (0.61)	-0.56** (0.08)	0.49	-0.10** (0.04)	1.39** (0.31)	-0.44** (0.08)	0.91
Japan	Floating	0.01 (0.02)	-0.19 (0.19)	0.24** (0.07)	0.00	-0.00 (0.00)	-0.01 (0.03)	0.24** (0.08)	0.00
Singapore	Intermediate	-0.02 (0.03)	0.66** (0.33)	-0.05 (0.07)	0.19	0.01 (0.03)	0.47* (0.24)	-0.36** (0.14)	0.00

B. Countries with an Exchange Rate Regime Change

Country	Regime Change	1987. 1~1997. 5				1998. 10~2002. 4			
		Alpha	Beta	Rho	Test for long-run slope=1	Alpha	Beta	Rho	Test for long-run slope=1
Indonesia	Intermediate -> Floating	0.15 (0.13)	-1.09 (1.13)	-0.22** (0.11)	0.04	-0.64 (0.43)	-4.08 (3.07)	0.03 (0.09)	0.12
Korea	Intermediate -> Floating	0.05 (0.09)	2.80** (0.98)	-0.10 (0.07)	0.09	0.00 (0.01)	0.15** (0.05)	0.13** (0.06)	0.00
Malaysia	Intermediate -> Fixed	0.04 (0.03)	0.11 (0.24)	0.07 (0.09)	0.00	0.02 (0.02)	0.09 (0.07)	0.16** (0.07)	0.00
Philippines	Intermediate / Fixed -> Intermediate	-0.09 (0.10)	2.23** (0.96)	0.27** (0.09)	0.11	0.13 (0.14)	-0.10 (0.72)	1.37** (0.28)	0.70
Thailand	Fixed -> Intermediate	0.08 (0.12)	2.61* (1.43)	-0.09 (0.07)	0.28	0.01 (0.04)	0.15 (0.21)	0.21* (0.12)	0.00

Notes: The estimation is based on the specification (1) described in the text. Standard errors of the estimated coefficients are in parentheses. Level of significance indicated by asterisks; ** 5 percent and * 10 percent. The column of the test for long-run slope shows the p-value for the significance level associated with the test of the hypothesis that the long-run response of local to U.S interest rates is one.

In Panel A of <Table 2> we compare the three countries (Hong Kong, Singapore, and Japan) that have never changed their exchange rate regimes throughout the sample period from 1987 to the present. The results are consistent with conventional predictions: interest rates in Hong Kong, which has maintained a fixed exchange regime, react more to U.S. interest rates than interest rates in Singapore with the intermediate regime, and far more than interest rates in Japan with the floating regime. For the pre-crisis period, the point estimates of β are 1.15 (s.e.= 0.61) for Hong Kong, 0.66 (s.e.=0.33) for Singapore, and -0.19(s.e.=0.19) for Japan. Hence, the estimate of the contemporaneous response of local interest rates to U.S. interest rates was the largest and statistically significant in the fixed regime. It was still statistically significant but smaller in the intermediate regime. The estimate is not significantly different from zero in the floating regime. The estimates of β exhibit a similar pattern among the exchange rate regimes for the post-crisis period. The fixed exchange rate regime of Hong Kong exhibits a full adjustment of local to international rates both in the pre-crisis and post-crisis periods. The null hypothesis of full long-run adjustment, that is, the unity of the long-run slope coefficient, $\beta/(1 - \rho)$, is always accepted. For Singapore with the intermediate regime, the null hypothesis is accepted in the pre-crisis period (p-value = 0.19), but it is rejected in the post-crisis period. For Japan, the hypothesis is always rejected.

Panel B of <Table 2> presents the results for the five countries—Thailand, Indonesia, Korea, the Philippines, and Malaysia—which have changed their regimes once during the whole period except the crisis period. Our main interest is in examining whether the β parameter has different values across the sub-periods when different exchange

regimes are adopted.

The estimates of β for Korea, the Philippines, and Thailand confirm the theory: the estimates turned out to be large and statistically significant in the pre-crisis period when the countries adopted intermediate or *de facto* pegged regimes. The estimates—2.80 (0.98), 2.23 (0.96), and 2.61(1.43) (with standard errors in parentheses)—are not statistically different from one. By contrast, the estimates become smaller, close to zero, in the post-crisis period when the countries chose to float. In fact, the estimates from the post-crisis period are not statistically significant for the Philippines and Thailand. In Korea, the estimate is still statistically significant, but the magnitude becomes smaller, 0.15 (s.e.=0.05).

The null hypothesis of full long-run adjustment is also accepted for all three countries in the pre-crisis period at the 5% significance level. But, it is rejected in the post-crisis period for Korea and Thailand.

In contrast to the conventional theory, local interest rates did not become more sensitive to foreign rates in Malaysia after it changed its exchange rate regime from an intermediate regime to a fixed one. This must be related to the tight capital controls adopted by the Malaysian government after the crisis. For Indonesia, the β estimates have negative values both in the pre-crisis and post-crisis periods. But, they are quite imprecise.

5. Discussion of the Estimation Results

<Figure 9> juxtaposes the estimate of monetary independence and exchange-rate volatility in the pre-crisis and post-crisis periods for

eight East Asian economies. Exchange-rate volatility is measured as an annualized standard deviation of monthly percentage change in nominal exchange rates against the US dollar. The measure of monetary independence is the β estimate, the sensitivity of local interest rates to the U.S. interest rates, presented in <Table 2>.

From the figure, it is clear that there is a strong negative relationship between the two variables. The regression result is as follows, with standard errors in parentheses:⁴⁾

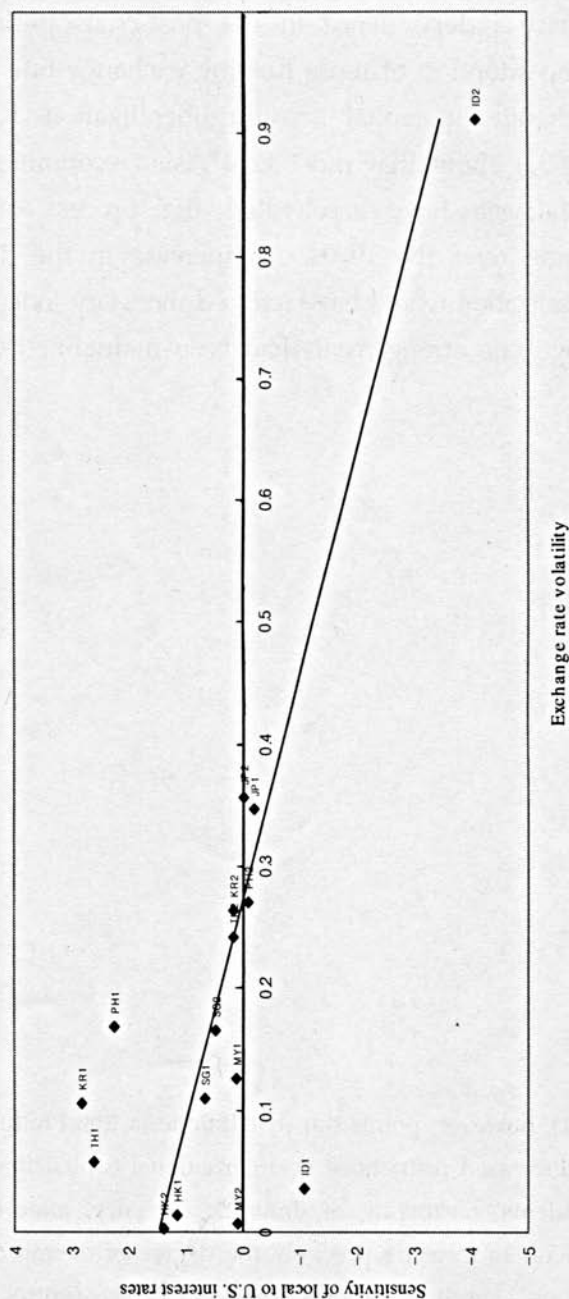
$$\begin{aligned}\beta \text{ estimate} &= 1.47 - 5.41 \text{ Exchang rate volatility} \\ &\quad (0.36) \quad (1.28) \\ R^2 &= 0.56, N=16\end{aligned}$$

Thus, countries under more floating exchange rate regimes had greater independence in monetary policy. Most noticeable in the figure is that in the four crisis-hit Asian economies of Indonesia, Korea, Thailand, and the Philippines, an increase in exchange rate volatility between the pre-crisis and the post-crisis periods is linked to a decrease in the sensitivity measure, that is, an increase in monetary independence.

The case of Malaysia in the post-crisis period seems to illustrate that in addition to the exchange rate regime, the degree of capital account liberalization is an important factor for monetary independence. Even with a fixed exchange rate regime, the monetary policy can be used independently by imposing capital control measures. Nevertheless, for other crisis-affected Asian countries, the significant

4) In the regression, exchange-rate volatility is still statistically significant, if we exclude Indonesia from the sample.

<Figure 9> Exchange rate volatility and the response of local to US interest rate



Notes: Exchange-rate volatility is measured as the annualized standard deviation of monthly percentage change in nominal exchange rates against the US dollar. The measure of monetary independence is the β estimate, the sensitivity of local interest rates to U.S. interest rates, in each period for each of the eight Asian economies, presented in Table 2. In the country codes, 1 indicates the pre-crisis period, 1987.1-1997.5, and 2 is the post-crisis period, 1998.10-2002.4.

increase in monetary independence in the post-crisis period must have come from the adoption of more floating exchange rate regimes, rather than the change in capital account liberalization. Kaminsky and Schmukler (2001) show that most East Asian economies except Indonesia and Malaysia have accelerated the process of capital account liberalization over the 1990s. An increase in the degree of capital account liberalization would have reduced monetary independence, if the same exchange rate arrangements had been maintained.⁵⁾

5) McCauley (2001), however, points out that Indonesia, the Philippines and Thailand have increased restrictions on international capital flow, in particular non-residents' borrowing of domestic currency, after the Asian crisis. It is difficult to measure precisely the degree of overall capital account liberalization as well as the effectiveness of capital control measures.

IV. Concluding Remarks

In this paper, we examine whether the adoption of new exchange rate arrangements has affected monetary independence in East Asian countries after the 1997 Asian crisis. We find that the sensitivity of local to U.S interest rates has declined for many Asian countries since they adopted floating exchange rate regimes after the crisis. Hence, we can conclude that the choice of exchange rate regime is a critical factor for the independence of monetary policy. Floating regimes appear to offer East Asian countries at least some degree of monetary independence.

The baseline sub-sample periods in the current paper have been chosen to eliminate the large uncertainty in the interest rate differentials during the Asian crisis period defined as June 1997 to September 1998, by assuming that a structural break in equation (1) occurred during the same period. Such a choice for the baseline sub-sample periods may be justified by the fact that, for the countries under investigation with either *de jure* or *de facto* exchange rate regime changes, the dates of the changes fall within the Asian crisis period.

However, we note that the timing of actual structural breaks in the degree of monetary independence in equation (1) and the timing of exchange regime change may not coincide. In subsequent research, we will allow for such a possibility and attempt to actually estimate the timing of the potential structural break in monetary autonomy.

Another caveat of our analysis is that our assessment of monetary independence is based on the observed degree of co-movement of lo-

cal and US interest rates. Thus, our approach is not specific about the actual operation of monetary policy. The actual degree of monetary independence may differ from what is observed if the monetary authority's exercise of its monetary autonomy is influenced by other factors such as a fear of floating, business cycle synchronization, or political and institutional circumstances. In subsequent research, we plan to address this issue. This analysis will provide us with more insight into the relative role of exchange rate regimes in monetary independence.

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<Appendix Table> Exchange Rate Regimes in East Asia

A. *De Jure* Regime (Official Classification by the IMF)

Country	Period	Exchange rate regime classification		
	From	To	Narrow	Broad
Philippines	Oct81	Jun82	Limited flexibility wrt U.S. dollar	Intermediate
	Jul82	Sep84	Managed floating	
	Oct84	Jan02	Independently floating	Floating
Singapore	Jun73	Jun87	Limited flexibility wrt. a basket	Intermediate
	Jul87	Jan02	Managed floating	
Thailand	Jan77	Feb78	Peg to U.S. dollar	Fixed
	Mar78	Jun81	Limited flexibility wrt a basket	Intermediate
	Jul81	Mar82	Managed floating	
	Apr82	Oct84	Limited flexibility wrt U.S. dollar	
	Nov84	Jun97	Limited flexibility wrt a basket	
	Jul97	Jun98	Managed floating	Floating
	Jul98	Jan02	Independently floating	
Hong Kong	Jul72	Oct74	Peg to U.S. dollar	Fixed
	Nov74	Oct83	Independently floating	Floating
	Oct83	Jan02	Peg to U.S. dollar	Fixed
Indonesia	Nov78	Jul97	Managed floating	Intermediate
	Aug97	Jan02	Free floating	Floating
Japan	Dec71	Jan73	Peg to U.S. dollar	Fixed
	Feb73	Jan02	Independently Floating	Floating
Korea	Aug76	Jan80	Peg to U.S. dollar	Fixed
	Feb80	Nov97	Managed floating	Intermediate
	Dec97	Jan02	Independent floating	Floating
Malaysia	Sep75	Mar93	Limited flexibility wrt U.S. dollar	Intermediate
	Apr93	Aug98	Managed floating	
	Sep98	Jan02	Pegged to U.S dollar	Fixed
China	Mar81	Jul87	Pegged to a basket	Intermediate
	Aug87	Aug98	Managed floating	
	Sep98	Jan02	Limited flexibility wrt U.S. dollar	Fixed

Note: This classification of exchange rate regimes is based on a quarterly database from the IMF which encompasses a total of ten regime categories, based on officially reported exchange arrangements.

Sources: Frankel, et al. (2002) and IMF *Annual Report on Exchange Arrangements and Exchange Restriction*.

B. *De Facto* Regime (Reinhart and Rogoff, 2002)

Country	Period	Exchange rate regime classification		
	From	To	Narrow	Broad
Philippines	Dec72	Sep83	De facto crawling band around US \$	Intermediate
	Oct83	Feb85	Managed floating	
	Mar85	Apr92	De facto crawling peg to US dollar	
	May92	Aug95	De facto band around US dollar	
	Sep95	Jun97	De facto peg to US dollar	Fixed
	Jul97	Dec97	Freely floating/Free falling*	Floating
	Dec97	Dec01	Managed floating	Intermediate
Singapore	Jun72	Jun73	Peg to US dollar	Fixed
	Jun73	Nov98	De facto moving band around US\$	Intermediate
	Dec98	Dec01	Managed Floating	
Thailand	Oct63	Mar78	Peg to US dollar	Fixed
	Mar78	Jul97	De facto peg to US dollar	
	Jul97	Jan98	Freely floating/Free falling*	Floating
	Jan98	Dec01	Managed floating	Intermediate
Hong Kong	Aug62	Jul72	Peg to pound sterling	Fixed
	Jul72	Oct83	De facto moving band around US \$	Intermediate
	Oct83	Dec01	Currency board system/Peg to US\$	Fixed
Indonesia	Dec70	Aug71	Peg to US dollar	Fixed
	Aug71	Oct78	De facto crawling band to US dollar	Intermediate
	Nov78	Jul97	De facto crawling peg to US dollar	
	Aug97	Jan02	Freely floating/Free falling*	Floating
	Apr99	Dec01	Freely floating	
Japan	Aug71	Dec71	Managed floating	Intermediate
	Dec71	Jan73	Bretton Woods Basket Peg	Fixed
	Feb73	Nov77	De facto moving band around US	Intermediate
	Dec77	Dec01	Independently Floating	Floating

Country	Period	Exchange rate regime classification		
	From	To	Narrow	Broad
Korea	May74	Feb80	Peg to US dollar	Fixed
	Feb80	Nov94	Pre announced crawling band	Intermediate
	Nov94	Nov97	De facto crawling peg to US dollar	
	Dec97	Jun98	Freely falling*	Floating
	Jul98	Dec01	Freely floating	
Malaysia	Jun67	Aug75	Peg to pound sterling	Fixed
	Sep75	Jul97	Limited flexibility wrt US dollar	Intermediate
	Aug97	Sep98	Freely floating/Free falling*	Floating
	Sep98	Dec01	Pegged arrangement	Fixed
China	Mar81	Jul92	Managed floating	Intermediate
	Aug92	Jan94	De facto crawling band around US\$	
	Jan94	Dec01	De facto peg to US dollar	Fixed

Note: Free falling is a new separate category for countries whose twelve—month rate of inflation is above 40%.

Source: Reinhart and Rogoff (2002).

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