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Exchange Rate Arrangements and Monetary Autonomy in Fourteen Selected Asian and Pacific Countries

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Abstract

Applying the autoregressive distributed lag model, this paper examines whether different exchange rate arrangements may affect monetary autonomy. In the short run, all the countries have moderate or significant monetary autonomy due to partial or small adjustments. In the long run, Hong Kong, New Zealand, the Philippines and Thailand make full or large adjustments whereas Australia, Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Singapore and Taiwan continue to possess moderate or significant monetary autonomy.

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1. Introduction

As many countries have considered the relative importance of monetary autonomy, exchange rate stability and free capital mobility, the trilemma (Mundell 1963) suggests that only two of the above policies can be achieved simultaneously. For those countries that have adopted free capital mobility, they would need to select exchange rate stability or monetary autonomy. Hence, the type of exchange rate arrangements is expected to affect the degree of monetary autonomy. This study examines the short-run and long-run effects of a change in the international interest rate on local interest rates for fourteen selected Asian and Pacific countries and determines whether countries with flexible exchange rates would have greater monetary autonomy. This paper includes more Asian and Pacific countries under different classifications of exchange rate arrangements (Cheung, Tam and Yiu, 2008; Kim and Lee, 2008; Kim and Yang, 2009; Edwards, 2010), applies the autoregressive distributed lag (ADL) model (Cheung, Tam and Yiu, 2008), and employs the Wald test to determine whether there would be a full adjustment in the long run. The ADL model is chosen because other models such as the simple static model, the lagged dependent variable model (Kim and Lee, p. 158, 2008), the finite distributed lagged model and the error correction model (Taguchi, 2011) are either nested within or equivalent to the ADL model.

Several seminal articles have examined the subject. Based on a sample of 18 industrial countries and 28 developing countries, Frankel, Schmukler and Servén (2004) find that although several large advanced countries can select their own rates over the long run, most other countries with flexible exchange rates react fully to international interest rates in the long run. In the short run, countries with flexible exchange rates respond to international interest rates with slower speed, suggesting that they possess some degree of monetary autonomy. Shambaugh (2004) examines whether different exchange rate arrangements would affect the degree of monetary autonomy. He shows that domestic interest rates in countries with pegged exchange rates are more sensitive to international interest rates than countries with non-pegged exchange rates.

Major findings of several recent studies on the subject for selected Asian countries can be summarized as follows: Countries with floating exchange rates tend to be less sensitive to a change in the U.S. interest rate and possess greater monetary autonomy (Kim and Lee, 2008; Taguchi, 2011) or to be highly sensitive to the U.S. interest rate due to fear of floating except for Japan (Kim and Yang, 2009). Countries with fixed or hard peg exchange rates and controls on free capital mobility such as China do not react much to a change in the U.S. interest rate and have greater monetary autonomy (Cheung, Tam and Yiu, 2008; Kim and Yang, 2009) or are highly sensitive to a change in the U.S. interest rate due to fear of floating (Taguchi, 2011). Asian countries tend to have large effects in the long run and slower and gradual adjustment paths (Edwards, 2010)

2. The Model

We can express the ADL(1,1) model as:

$$R_t = \alpha_0 + \alpha_1 IR_t + \alpha_2 IR_{t-1} + \alpha_3 R_{t-1} + v_t \quad (1)$$

where

R = the local interest rate,
IR = the international interest rate, and
ν = the error term.

In equation (1), the short-run effect = α_1 and the long-run effect = $(\alpha_1 + \alpha_2)/(1-\alpha_3)$. Several models are nested within the ADL model. If $\alpha_2 = \alpha_3 = 0$, equation (1) reduces to a simple static model:

$$R_t = \alpha_0 + \alpha_1 IR_t + \nu_t \tag{2}$$

If $\alpha_2 = 0$, equation (1) becomes a lagged dependent variable model:

$$R_t = \alpha_0 + \alpha_1 IR_t + \alpha_3 R_{t-1} + \nu_t \tag{3}$$

If $\alpha_3 = 0$, equation (1) becomes a finite distributed lag model:

$$R_t = \alpha_0 + \alpha_1 IR_t + \alpha_2 IR_{t-1} + \nu_t \tag{4}$$

We can derive an error correction model from the ADL(1,1) model in equation (1):

$$\Delta R_t = (\alpha_0 + \delta_0\delta_1) + \alpha_1 \Delta IR_t + \delta_0 (R_{t-1} - \delta_1 - \delta_2 IR_{t-1}) + \nu_t \tag{5}$$

where $\delta_0 = \alpha_3 - 1$, and $\delta_2 = -(\alpha_1 + \alpha_2)/(\alpha_3 - 1)$.

3. Empirical Results

The data are collected from the *International Financial Statistics*, which is published by the International Monetary Fund. The local interest rate is represented by the money market rate or a representative interest rate. The international interest rate is represented by the U.S. federal funds rate. The sample consists of fourteen Asian and Pacific countries under five different exchange rate arrangements (International Monetary Fund, 2009). They are the currency board (Hong Kong), the other conventional fixed peg arrangement (Bangladesh), crawling peg (China), managed floating (India, Indonesia, Malaysia, Singapore, Taiwan and Thailand), and independently floating (Australia, Japan, Korea, New Zealand, and the Philippines). Monthly data are used. The sample period may begin with different months and years across countries and ends in the same time period in 2011.M12. To account for possible structural breaks attributable to the country-specific or Asian financial crisis, dummy variables are added to Indonesia (1997.M8-1999.M6), Korea (1997.M12-1998.M6), Singapore (1997.M12-1998.M1), and Thailand (1997.M5-1998.M6). The ADF test on the residuals shows that these time series variables in each of the countries are cointegrated.

Table I presents empirical results. The GARCH, EGARCH and other GLS methods are considered and employed in empirical work if the error term exhibits both

Table I. Estimated Regressions of Global Transmission of Interest Rates

	IR_t	IR_{t-1}	R_{t-1}	R^2	Long-run effect	H_0: Long-run effect = 1
Currency board						
Hong Kong	0.645a (11.092)	-0.190a (-3.087)	0.538a (18.145)	0.823	0.986	Not rejected
Other conventional fixed peg						
Bangladesh	0.045a (2.708)	-0.030c (-1.790)	0.980a (166.474)	0.990	0.716	Rejected
Crawling peg						
China	0.121a (11.071) 0.004a (14.698)	-0.120a (-10.964)	0.977a (456.797) 0.966a (145965.9)	0.990 0.990	0.035 0.107	Rejected
Managed floating						
India	0.022a (9.712)	-0.011a (-4.350)	0.972a (1632.178)	0.991	0.416	Rejected
Indonesia	-1.186a (-11.575) 0.148a (9.684)	1.694a (15.150)	0.655a (41.400) 0.743a (50.541)	0.887 0.840	NA 0.574	Rejected
Malaysia	-0.145b (-2.016) 0.032a (2.843)	0.181b (2.385)	0.846a (20.930) 0.851a (21.444)	0.811 0.808	NA 0.214	Rejected
Singapore	0.478a (18.119)	-0.382a (-13.290)	0.856a (40.688)	0.935	0.663	Rejected
Taiwan	0.275a (20.543)	-0.243a (-16.965)	0.949a (229.282)	0.928	0.611	Rejected
Thailand	0.460a (7.961)	-0.280a (-3.828)	0.839a (20.765)	0.942	1.124	Rejected
Independently floating						
Australia	0.133a (8.101)	-0.124a (-7.286)	0.973a (169.643)	0.969	0.338	Rejected
Japan	0.018a (5.161)	-0.016a (-4.433)	0.984a (434.988)	0.991	0.124	Rejected
Korea	0.406a (14.260)	-0.379a (-12.980)	0.952a (143.581)	0.964	0.563	Rejected
New Zealand	0.346a (6.689)	-0.321a (-6.048)	0.985a (132.231)	0.965	1.667	Rejected
Philippines	0.316c (1.793)	-0.060 (-0.314)	0.677a (8.904)	0.615	0.978	Not rejected

Notes:
R_t is the dependent variable. Figures in the parenthesis are t-statistics. Letter a, b or c indicates that the coefficient is significant at the 1%, 5% or 10% level. Classifications of exchange rate regimes are based on the International Monetary Fund (2009).
The beginning sample period for each of the countries is 1994.M1 for Hong Kong, 1972.M1 for Bangladesh, 1990.M4 for China, 1968.M2 for India, 1986.M6 for Indonesia, 1971.M2 for Malaysia, 1973.M9 for Singapore, 1977.M2 for Thailand, 1981.M2 for Taiwan, 1969.M8 for Australia, 1963.M11 for Japan, 1991.M2 for Korea, 1985.M6 for New Zealand, and 1977.M2 for the Philippines. The ending sample period of 2011.M12 is the same for all the countries.
To save space, estimated coefficients for the intercepts and dummy variables are not reported here and will be made available upon request.

autocorrelation and heteroskedasticity. In the currency board arrangement, Hong Kong has a short-run effect of 0.645, an adjustment coefficient of 0.462, and a long-run effect of 0.986. According to the Wald test, the null hypothesis that the long-run effect is equal to one cannot be rejected at the 5% level. In the other conventional fixed peg arrangement, Bangladesh shows a very small short-run effect of 0.045, a pretty small adjustment coefficient of 0.02, and a long-run effect of 0.716. The Wald test shows that the null hypothesis of the long-run effect being equal to one can be rejected at the 10% level. In the crawling peg system, the short-run effect in China is 0.121 and the adjustment coefficient is 0.023. The long-run effect is calculated to be 0.043, which is smaller than the short-run effect, suggesting that other models may need to be considered. When the lagged dependent variable model is applied, the short-run and long-run effects are estimated to be 0.004 and 0.107, respectively.

In the managed floating arrangement, the coefficient of IR_t has a wrong sign for Indonesia and Malaysia. Hence, the lagged dependent variable model is employed for these two countries in the analysis. The short-run effect ranges from a low of 0.022 for India to a high of 0.478 for Singapore; adjustment coefficients are relatively low and less than 0.260; and the long-run effect varies from a low of 0.214 for Malaysia to a high of 1.124 for Thailand. The null hypothesis that the long-run effect is equal to one can be rejected for these six countries at the 1% or 5% level. Thailand makes a partial adjustment in the short run and more than a full adjustment in the long run, suggesting that Thailand has moderate monetary autonomy in the short run. Other countries make small or partial adjustments in the short run and long run. In other words, other countries possess moderate or significant monetary autonomy in the short run and long run.

In the independently floating arrangement, the short-run effect varies from 0.018 for Japan to 0.406 for Korea; the adjustment coefficient ranges from 0.015 for New Zealand to 0.323 for the Philippines; and the long-run effect ranges from 0.124 for Japan to 1.667 for New Zealand. The null hypothesis that the long-run effect equals one cannot be rejected for the Philippines and can be rejected for the other countries. Australia and Japan show considerable monetary autonomy in the short run and long run whereas New Zealand and the Philippines make partial adjustments and exhibit moderate monetary autonomy in the short run and make a full or large adjustment in the long run. Korea makes partial adjustments and has moderate monetary autonomy in the short run and long run.

4. Summary and Conclusions

This paper has examined global transmission of interest rates for fourteen selected Asian and Pacific countries under five different exchange rate arrangements. The autoregressive distributed lag model is applied. There are similarities and differences in the short-run and long-run effects across countries.

In the currency board arrangement, Hong Kong has a medium short-run effect and a full adjustment in the long run. In the other conventional fixed peg arrangement, Bangladesh has a very small short-run effect and a partial adjustment in the long run. In crawling peg, China does not react much to the U.S. interest rate and has significant monetary autonomy in the short run and long run. In the managed or independently floating regime, all the countries have moderate or significant monetary autonomy in the short run, and except for Thailand, New Zealand and the

Philippines making large or full adjustments in the long-run, other countries have moderate or significant monetary autonomy in the long run.

To summarize, in the short run, all these countries under five different exchange rate regimes possess moderate or significant monetary autonomy because of partial or small adjustments. In the long run, Hong Kong, Thailand, New Zealand and the Philippines make full or large adjustments whereas the other ten countries under different exchange rate regimes continue to show moderate or significant monetary autonomy.

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