International Liquidity Swaps: Is the Chiang Mai Initiative Pooling Reserves Efficiently ?

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Abstract

We analyze the network of bilateral liquidity swaps (BSAs) among the ASEAN+3 countries. We find that the network has taken the correlation of capital flows in the region into account, in the sense that countries with lower correlation of reserve growth have engaged in larger BSAs. All else equal, a decimal point increase in the correlation of international reserve growth decreases the size of a bilateral swap agreement between 18 and 27%. Moreover, we find that the approximatedly $ 60bn of BSAs have had a limited impact, if any, on government bond spreads so far. Finally, we identify potential gains from inter-regional BSAs.

Keywords: insurance; international reserves; liquidity; sovereign risk; swaps

JEL classification: F30; F34

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1 Introduction

The aftermath of the Asian financial crisis in 1997/8 has been characterized by increased demand for insurance among sovereign states, as evidenced by the massive accumulation of international reserves. The stock of official reserves worldwide has jumped to $ 4.3 trillion dollars in 2005, from $ 2.1 trillion dollars just five years earlier. This increase in insurance demand has not been accompanied by an increase in quotas of the International Monetary Fund – that arguably plays the role of a "universal insurer". In fact – as Figure 1 shows – at 212 billion SDRs IMF quotas are currently at an historical low in comparison to the stock of official reserves accumulated by all of its member countries individually. IMF quotas correspond to only 6.5% of worldwide official reserves - by all means, a marked decrease from the around 30% during the Bretton-Woods era. Also unprecedented is the degree of concentration of official reserves, as evidenced by the marked increase in the Herfindahl index for reserve holdings since World War II (see Figure 2). In particular, the People's Republic of China and Japan currently hold nearly

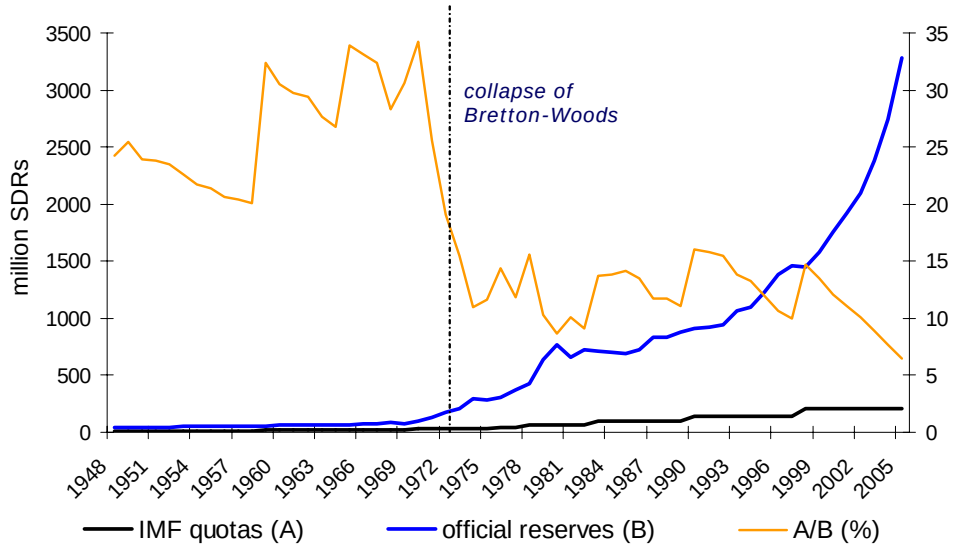

Figure 1: Self-Insurance vs. Reserve Pooling via IMF

20% of worldwide official reserves each. Since universal coinsurance arrangements tend to lead to underinsurance (Irwin, Penalver, Salmon and Taylor (2005)), it seems natural that a dynamic market will pursue additional coinsurance mechanisms to satisfy the demand of sovereign states. Members of an universal coinsurance arrangement might simultaneously engage in reserve pooling with a subset of member countries. The presence of regional leaders or, more generally, large reserve holders can diminish the cost of coordination among otherwise diffuse countries and might make the exploitation of large gains from international cooperation possible. The natural emergence

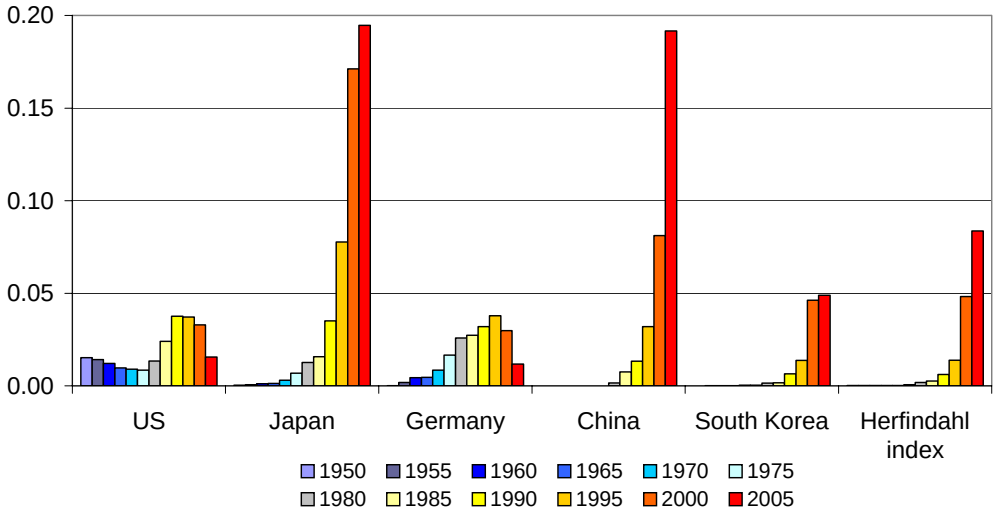

Figure 2: Distribution of Official Reserves

of arrangements that facilitate the swap of liquidity thus raises interesting theoretical and empirical questions for the international economist. We focus on a few of them. To be more specific, this study focuses on the development of a network of bilateral liquidity swaps, under the so-called Chiang Mai Initiative. In May 2000, the finance ministers of the ASEAN+3 (China, Japan and South Korea) announced their intent to establish a network of bilateral swap agreements (henceforth BSAs), aiming at greater monetary cooperation. The agreement has been heralded by some as laying the foundations for an Asian Monetary Fund. Although such claims might well be the subject of controversy, the experience constitutes an interesting episode

of reserve pooling outside of federations or fully-fledged economic unions. [1] Following the meeting in Chiang Mai, Japan, South Korea and China in turn signed bilateral agreements with some of the ASEAN countries. BSAs consist of 90-day currency swaps that can be renewed for periods of up to two years. A renewed commitment to the arrangement was made in May 2005, when countries agreed to expand the existing network, with China pledging to double the scale of its currency swaps. These currency swaps currently total about $ 60bn.

The existence of a network of BSAs begs the question of whether the agreements have been efficiently exploiting the largest potential benefits from international reserve pooling in the region. Furthermore, as the volume of BSAs that countries as Indonesia and the Philippines can draw on already correspond to three and four times their respective IMF reserve tranches, one could conjecture that the network of BSAs could alter the perceived likelihood of liquidity crisis and hence sovereign bond prices. [2] Moreover, BSAs may create benefits beyond the nominal amount of the swaps involved as the

[1] A $ 200 million multilateral swap arrangement had been in place among the ASEAN countries since 1977. This arrangement was extended in November 2000 so as to allow each member to withdraw twice its contribution of $ 150mn for up to 12 months. For an earlier case of international reserve pooling see Wright (1954).

[2] In principle, this "second line of defense" would entitle the Philippines to increase its current reserve holdings by about 1/3 by drawing on hard currency from its neighbours, while Indonesia could top up its reserves by a further $ 9bn.

agreements constitute a signal of intended political support in the event of financial distress. On the downside, there is the theoretical possibility that the existence of such enhanced insurance mechanisms might cause moral hazard among member countries, possibly leading to underaccumulation of own reserves. This risk, however, may already have been mitigated with the inclusion of a third party: BSAs are mostly complementary to IMF disbursements as initially 90% – more recently 80% – of resources are conditioned on the pre-existence of an IMF program. [3] The aim of this paper is to address these questions based on economic data that are available at this point in time.

Outline. The paper proceeds as follows: section 2 analyses the determinants of the network of BSAs and the size of individual swaps finding that pairs of countries for which the co-movement in international reserves is negligible (or negatively related) did engage in larger currency swap agreements; section 3 examines whether market participants have priced in the arrangements into their bond valuations. Section 4 discusses the potential for reserve pooling among other country pairs showing that cross-Pacific agreements could exploit even larger gains from cooperation. Section 5 concludes.

[3] The swap between Japan and Singapore in 2005 increased the unconditional share to 20%. It is important to note that BSAs also contain opt-out clauses.

2 The Determinants of the Size of Bilateral Swap Agreements

Table 1 shows the BSAs that were active between China, Japan, South Korea, Indonesia, Malaysia, the Philippines, Singapore and Thailand as of March 2006. The average swap agreement amounts to $ 1bn. 24 of the possible 56 swap combinations have already been activated – the three large economies being more active in signing BSAs. The largest swap arrangement is the one between Japan and South Korea: Japan made no less than $ 10bn of its international reserves available to South Korea, while it could draw $ 5bn from it on demand. However, analyzing the mere existence of an agreement misses out on the information contained in the amount involved in each BSA. In Table 3, we show the results of an ordered probit regression using the size of the agreement as the dependent variable. Irrespective of the specification used, we find that three observations are statistically (and economically) significant:

A) the size of a BSA increases with the relative size of the sender economy relative to the receiver;

The three largest economies of the group were on average 20.7 times

larger than the smaller ones in 2000. If the smaller economies doubled in size relative to the larger ones, the average BSA would drop by about $ 260mn.

B) the size of the BSA increases with the stock of reserves of the sender country relative to its imports;

An increase in the stock of reserves equivalent to one month of imports increases the size of the BSA by about $ 390mn. In other words, the recent surge in international reserve holdings seen in China, Japan and South Korea may have created room for further increases in already existing swap arrangements. This observation seems to be in line with the recent upward revision in some BSAs.

C) the size of the BSA is inversely proportional to the correlation of international reserve growth.

An increase in the correlation of monthly reserve growth in the twenty-year period up to 2000 by a decimal point decreases the size of the BSA by between 18 and 27%.

Table 1 shows that we have also controlled for the distance between capitals, ratio of GDP per capita, extent of bilateral trade and correlation of output. While all control variables attain the expected sign, they are generally not important.

Result C) is particularly relevant for assessing whether gains arising from cooperation have efficiently been explored within the region. The variance-covariance matrix shows that the monthly balance of payments were highly correlated between Malaysia, the Philippines, Singapore and Thailand between 1981 and 2000. Indeed, this sub-group shows the highest positive correlations in monthly reserve growth: 5 of the 6 correlations within this group are strongly positive and statistically significant at the 1% confidence level. The total absence of BSAs within this group can be rationalized by the high correlation of capital flows towards these countries. On the other hand, China's international reserves tend to move in opposite directions relative to the reserves of countries as South Korea, Malaysia and the Philippines. Furthermore, their stock has no correlation with reserves accumulated by Indonesia, Japan or Singapore. The Chinese government has already signed BSAs with all but the last of these. In the case of Japan, the highest gains appear from pooling reserves bilaterally with Indonesia and Thailand. Japan signed a $ 6bn BSA with the first and a $ 3bn with the latter. However, based on the strongly positive co-movement of reserves only, the swap signed between Japan and South Korea seems to be the one where the opt-out clauses would seem most likely to be exercised – as reserve movements of the two

are strongly correlated.

Arguably, one limitation of the above analysis is that the patterns of co-movements of capital might change over time, in particular during periods of distress. The three latest regressions in Table 1 however show that our results are not particularly sensitive to the selection of the period during which the correlation in reserve growth is computed. Even if we take only the correlation that was observed during the Asian crisis (1997-1999), we do find that pairs of countries with lower reserve growth correlation engage in larger BSAs at the 1% confidence level.

3 Secondary Bond Markets

Having established the determinants of the size of BSAs in the previous section, we now analyze whether market participants have taken BSAs into account in government bond valuations. In particular, we look at the evolution of secondary market spreads of representative yankee sovereign bonds.[4]The average spread over US Treasury bills in this asset class since 1998 was of 284 basis points, dropping to 228 basis points in the last five years. In order

[4]Spreads were computed as excess yields of the bonds over the 10 year US Treasury bond due in July 2006.

to test the conjecture that BSAs affected bond returns we use monthly data on liquid representative sovereign bond yields for China, Indonesia, South Korea, Malaysia, the Philippines and Thailand (see the Appendix for a detailed description of the data and sources). Japan and Singapore are left out as they have obtained AA and AAA sovereign credit ratings, which are associated with negligible risk levels.

Table 4 and 5 report the results for the six countries in the group. If anything, large reserve holdings relative to average monthly imports reduce risk spreads, while larger debt stocks relative to export revenues increase them. In the case of South Korea and Thailand, a one percentage point increase in the growth rate of output reduces the risk spread by between 9 and 13 basis points. Also, during this period, increased liquidity as measured by the interest rates on US Treasury bills are associated with reductions in risk spreads. The estimation results suggest that the effect of BSAs on bond spreads is important only in the case of Malaysia and possibly Indonesia. Only in the case of Malaysia, however, the effect remains important if we include a time trend to account for falling international risk spreads throughout the sample. We were unable to identify any negative effect on risk spreads of sending countries. This should come as no surprise, given the typically very large

reserve holdings of these.

Estimates of individual countries, however, should be taken with caution due to micronumerosity. To estimate the effect of BSAs on bond spreads Zellner's restricted SUR method was also used, allowing for autocorrelation and unequal number of observations for the different countries. We assumed that the error term follows an AR(1) process and allowed for contemporaneous correlation of error terms. We ran a simple OLS regression for each country and transformed the data using Cochrane-Orcutt. We then pooled the transformed data to increase efficiency and ran seemingly unrelated regressions forcing coefficients to be the same across countries. The coefficients of the amount of international reserves and of the total amount made available by bilateral liquidity swaps were allowed to differ. Finally, since our analysis is restricted to the post-Asian crisis period we allowed for a time trend in bond spreads.[5]Pooling all observations, we found that bond spreads tend to be lower the higher the reserves to import ratio, although this effect is only statistically significant at the 10% level for the smaller countries (i.e. Indonesia, Malaysia, the Philippines and Thailand). Moreover, a reduction in external indebtness equalling one month of export revenues reduces the

[5]We also tested the data with a quadratic term, which turned out not to be significant.

risk spread by 10 basis points and an increase in the annual growth rate by one percentage point reduces the spread by 6.6 basis points on average. In general, the effect of BSAs on risk spreads was not found to be significant.

All in all, we conclude that the evidence that BSAs have contributed to the reduction in risk spreads in South East Asia is very weak. This might be due to the fact that international reserve stocks themselves are hardly significant in reducing risk spreads in the area. Moreover, a skeptic investor could point at the opt-out clauses in the BSAs or the high correlation of supply shocks hitting the region to justify the limited effectiveness of the arrangements to reduce risk spreads. [6] One example illustrates the results: the Kingdom of Thailand had a BSA of $ 3bn in force with Japan since July 2001. The BSA expired in July 2004 with renewal being delayed by six months due to political opposition to the deal in Thailand. A bilateral deal was finally signed on January 25th, 2005. We found no evidence that the risk spread on the Thai bond increased relative to other countries in the region during the period in which the renewal of the BSA was uncertain. Therefore, we conclude that even though the network may prove to be important in future, so far it seems that market participants have largely ignored the

[6] For an estimation of the correlation matrix of supply shocks in the region see Bayoumi and Eichengreen (2000).

effect of BSAs when pricing sovereign bonds.

4 Cross-Pacific BSAs

In Section 2 we had found that – within the Far East – reserve swaps have indeed been larger between countries that showed no or even negative correlation in reserve variation. That section however did not address the issue of country selection: it was restricted to the countries that have engaged in BSAs. It is quite likely, however, that the largest benefits could be reaped in agreements that go beyond the more immediate economic region. Table 6 shows the correlation of reserve variation of the ASEAN+3 countries with the four largest Latin American economies. It is noteworthy that four of the five largest negative correlations in balance of payments come from cross-pacific pairs: South Korea-Mexico, Japan-Argentina, China-Brazil and Japan-Brazil. Within Latin America, there is a strong negative correlation in reserve movements between Argentina and Mexico. As a counterfactual exercise, we find that if Chile were a member of ASEAN, it would have signed a $ 3bn BSA with South Korea, a $ 4bn BSA with China and a $ 5.5bn BSA with Japan. Chile in turn would have granted access to $ 3.5bn of its own

reserves to each of them. In other words, with these three hypothetical BSAs, Chile could prop up its reserves by 83% on demand, while making 70% of its reserves available to China, Japan and South Korea. Alternatively, South Korea and Mexico could have signed a $ 3.5bn BSA to exploit the strongly negative correlation in their reserves.

5 Concluding Remarks

Our results suggest that policymakers have been efficiently exploiting the potential benefits from within region reserve pooling in the ASEAN+3 countries. BSAs have been signed mostly by countries with large reserve stocks enhancing the insurance provided to small economies in the region. Also, the agreements seem to have taken the correlation matrix of reserve variation into account. This should diminish potential concerns over opt-out clauses. Based on the correlation matrix of reserve variations however, there still seem to be important unexplored opportunities for reserve pooling across economic regions.

There is only weak evidence on the impact of BSAs on secondary market bond valuations. One possibility is that market participants are taking a

cautious approach, waiting to price in the mechanism once it has passed a first test. It is important to highlight that the apparent failure to affect market sentiment should not be taken as a sign of the ineffectiveness of the political effort. In our view, the efficiency of the arrangement lies ultimately in the resolution of potential liquidity shortages, irrespective of market sentiments.

Interestingly, as the stated objective of the Chiang Mai Initiative is to deepen financial integration in the region, one could argue that the arrangement might be self-defeating: to the extent that financial integration increases the correlation of shocks hitting the region, it also undermines the credibility of bilateral swap arrangements. The counter argument to this objection is that, if the current configuration is maintained, the major providers of liquidity, namely China, Japan and South Korea - that together hold more than 40% of the world's international reserves are not the most likely to be dragged into a sudden liquidity shortage.

In our view, the notion that the apparent failure of BSAs to affect risk premia is due to the IMF link present in the swaps is less warranted. The liquidity assistance provided to Malaysia and South Korea under the New Miyazawa Initiative - that did not contain the IMF link - does not seem to be more effective in reducing risk premia. Moreover, there is arguably a theoret-

ical case for an arbitrator in BSAs, especially so if they are symmetric. If it were not so, it would be easy for a country to undo the request for assistance from a partner by requesting an equivalent assistance at the same time. The conditioning on an externally imposed adjustment program might thus improve the very credibility of the arrangements. Future research might want to analyze if bilateral swap agreements have affected reserve accumulation of the countries involved due to moral hazard.

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Data Sources

Table 1. Sovereign Bonds

CHG08	People's Republic of China 7.3%	12/15/2008
IND06	Republic of Indonesia 7.75%	8/1/2006
KOG08	Republic of Korea 8.875%	4/15/2008
MYG09	Federation of Malaysia 8.75%	6/1/2009
PHG08	Republic of Philippines 8.875%	4/15/2008
THU07	Kingdom of Thailand 7.75%	4/15/2007

Secondary market valuations obtained from Datastream.

Btrade: natural log of bilateral trade in US dollars in year 2000. Rose (2005).

External Debt stock: Line K - Total liabilities to banks (consolidated). BIS-IMF-OECD database.

Exports, Imports, International Reserves: monthly data from IFS IMF (April 2006).

Distance: natural log of distance in km (obtained from http://www.indo.com/cgi-bin/)

GDP and GDP per capita at current values: from the World Bank's WDI.

Output correl: from annual GDP volume index (BVPZF). IFS IMF. (Data for Mainland China are unavailable at a higher frequency.)

Table 2 - BSAs

agreement	currency	date	amount	bi- ?
Japan-South Korea (replaced)	$/Won	July 2001	$ 2bn	no
Japan-Thailand (repl.)	$/Baht	July 2001	$ 3bn	no
Japan-Philippines (repl.)	$/Peso	Aug 2001	$ 3bn	no
Japan-Malaysia	$/Ringitt	Oct 2001	$ 1bn	no
PR China-Thailand	$/Baht	Dec 2001	$ 2bn	no
Japan-PR China	Yen/Renm	Mar 2002	$ 3bn	yes
South Korea-Thailand	$/Baht	June 2002	$ 1bn	yes
PR China-South Korea	Renm/Won	June 2002	$ 2bn	yes
South Korea-Malaysia (repl.)	$/Ringitt	July 2002	$ 1bn	yes
South Korea-Philippines (repl.)	$/Peso	Aug 2002	$ 1bn	yes
PR China-Malaysia	$/Ringitt	Oct 2002	$ 1.5 bn	no
Japan-Indonesia	$/Rupiah	Feb 2003	$ 3bn	no
PR China-Philippines	$/Peso	Aug 2003	$ 1bn	no
Japan-Singapore	$/SG$	Nov 2003	$ 1bn	no
South Korea-Indonesia	$/Rupiah	Dec 2003	$ 1bn	yes
PR China-Indonesia	$/Rupiah	Dec 2003	$ 1bn	no
Japan-South Korea	$/Won	July 2004	$ 2bn	no
Japan-Philippines	$/Peso	Aug 2004	$ 3bn	no
Japan-Thailand	$/Baht	Jan 2005	$ 3bn	yes
Japan-Indonesia	$/Rupiah	Aug 2005	$ 6bn	no
South Korea-Malaysia	$/Ringitt	Oct 2005	$ 1.5bn	yes
South Korea-Philippines	$/Peso	Oct 2005	$ 1.5bn	yes
PR China-Indonesia	$/Rupiah	Oct 2005	$ 2bn	no
Japan-Singapore	$/SG$	Nov 2005	$ 3bn	no
Singapore-Japan	$/Yen	Nov 2005	$ 1bn	no
Japan-South Korea*	$/Won	Feb 2006	$ 10bn	no
South Korea-Japan*	$/Yen	Feb 2006	$ 5bn	no

* replacing $5 bn of the New Miyazawa Initiative.

Source: ASEAN Secretariat and JSM HK.

Table 1 - The BSA Matrix

(in $ bn)

Sender/Receiver	CHI	IDN	JAP	KOR	MYS	PHI	SGP	THA	**sent**
China (CHI)		2	3	2	1.5	1	0	2	11.5
Indonesia (IDN)	0		0	1	0	0	0	0	1
Japan (JPN)	3	6		10	3.5	3	3	3	31.5
S Korea (KOR)	2	1	5		1.5	1.5	0	1	12
Malaysia (MYS)	0	0	0	1.5		0	0	0	1.5
Philippines (PHI)	0	0	0	1.5	0		0	0	1.5
Singapore (SGP)	0	0	1	0	0	0		0	1
Thailand (THA)	0	0	0	1	0	0	0		1
received	5	9	9	17	6.5	5.5	3	6	

Table 2 - Correlation of Monthly Reserve Growth Rates 1981-2000

	CHI	IDN	JAP	KOR	MYS	PHI	SGP	THA
China (CHI)	1							
Indonesia (IDN)	-0.032	1						
Japan (JPN)	0.021	.037	1					
S Korea (KOR)	-0.158**	-0.049	0.188**	1				
Malaysia (MYS)	-0.140**	0.171***	0.119*	-0.099	1			
Philippines (PHI)	-0.162**	0.180***	0.185***	-0.060	0.289***	1		
Singapore (SGP)	0.083	0.011	0.171***	0.279***	0.394***	0.280***	1	
Thailand (THA)	0.237***	0.168***	-0.162**	-0.111*	0.317***	0.045	0.534***	1

*, ** and *** denote statistical signifficance at the 10%, 5% and 1% confidence level respectively.

Table 3 - Ordered Probit

D.V.: Size of BSA							sub-sample reserve correl. 1997-99	1991-00	1996-00
GDPsender/GDPreceiver	0.044	0.027	0.031	0.027	0.026	0.025	0.035	0.018	0.032
	4.66***	2.53**	3.22***	3.03***	2.80***	2.79***	3.71***	1.80*	3.54***
Corr. of Reserve Growth	-2.321	-1.800	-2.149	-2.213	-2.228	-2.671	-1.156	-1.442	-1.555
	2.83***	1.86*	2.25**	2.32**	2.34**	2.74***	2.66***	2.31**	3.61***
Reserves/Imports		0.398	0.390	0.381	0.358	0.390	0.305	0.424	0.314
		2.83***	2.79***	2.68***	2.45**	2.59***	1.74*	2.68***	1.81*
Log of distance in km			-0.254	-0.238	-0.263	-0.263	0.081	-0.153	0.090
			1.02	0.95	1.04	1.05	0.32	0.58	0.35
GDPpc sender/GDPpc receiver				0.015	0.015	0.016	0.017	0.012	0.015
				1.37	1.39	1.47	1.60	1.05	1.35
Bilateral trade/GDP sender					0.063	0.075	0.030	0.055	0.053
					0.43	0.50	0.19	0.36	0.31
Correlation of Output Growth						0.534	1.074	0.362	0.927
						1.18	1.70*	0.86	1.85*
Observations	56	56	56	56	56	56	56	56	56
Pseudo R2	0.132	0.190	0.195	0.202	0.202	0.208	0.209	0.198	0.221
Log likelihood	-71.25	-66.54	-66.14	-65.57	-65.51	-65.04	-64.93	-65.88	-63.96

*, ** and *** denote statistical signifficance at the 10%, 5% and 1% confidence level respectively.

Table 4 - Prais-Winsten

D.V.: Spread in b.p.

	China	Indonesia	S. Korea	Malaysia	Philippines	Thailand
Reserves/Imports (t-1)	-20.74	-61.89	-49.86	-13.71	-57.66	22.74
	5.76***	1.63	3.14***	1.14	1.06	1.03
Tdebt/Exports (t-1)	35.62	6.32	40.79	-11.53	22.01	7.60
	4.89***	0.54	2.33**	0.58	0.54	0.89
Growth (t-1)	5.14	-3.84	-9.55	3.45	-2.24	-13.60
	0.84	0.85	2.68***	1.38	0.19	3.91***
Yield 10y T-Bill	-18.47	-142.3	0.83	-0.41	4.55	-0.07
	2.14**	2.39**	0.03	0.04	0.12	0.00
BSA/Imports (t-1)	132.7	-189.4	59.1	-103.8	-10.9	4.5
	1.52	1.79*	0.84	2.98***	0.18	0.10
Observations	83	102	91	73	91	84
R2	0.430	0.110	0.510	0.130	0.020	0.400
AR(1) coeff.	0.579	0.891	0.508	0.948	0.855	0.609

*, ** and *** denote statistical signifficance at the 10%, 5% and 1% confidence level respectively.

Table 5 - Prais-Winsten (with Time Trend)

D.V.: Spread in b.p.

	China	Indonesia	S. Korea	Malaysia	Philippines	Thailand
Reserves/Imports (t-1)	-10.46	-48.64	-21.48	-8.27	-133.61	10.28
	1.49	1.43	0.81	0.75	3.90***	0.48
Tdebt/Exports (t-1)	-31.52	-20.59	24.03	-10.69	3.75	-22.51
	1.69*	0.42	0.92	0.69	0.12	1.41
Growth (t-1)	6.00	-2.38	-11.93	3.79	-3.53	-11.33
	0.98	0.52	3.00***	1.88*	0.32	3.04***
Yield 10y T-Bill	-21.65	-131.7	-0.03	3.17	-20.98	-20.47
	2.47**	2.51**	0.00	0.37	0.62	0.87
BSA/Imports (t-1)	96.5	-6.4	77.8	-92.2	31.4	56.9
	0.98	0.06	0.89	3.03***	0.51	1.22
Significant Trend	yes	no	no	yes	yes	no
Observations	83	97	91	73	91	84
R2	0.420	0.440	0.560	0.700	0.460	0.520
AR(1) coeff.	0.662	0.651	0.461	0.589	0.478	0.535

*, ** and *** denote statistical signifficance at the 10%, 5% and 1% confidence level respectively.

Table 6 - Correlation of Monthly Reserve Growth Rates 1981-2000

	China	Indonesia	Japan	S. Korea	Malaysia	Philippines	Thailand	Singapore	Argentina	Brazil	Chile	Mexico
China	1											
Indonesia	-0.032	1										
Japan	0.021	.037	1									
South Korea	-0.158**	-0.049	0.188**	1								
Malaysia	-0.140**	0.171***	0.119*	-0.099	1							
Philippines	-0.162**	0.180***	0.185***	-0.060	0.289***	1						
Thailand	0.083	0.011	0.171***	0.279***	0.394***	0.280***	1					
Singapore	0.237***	0.168***	-0.162**	-0.111*	0.317***	0.045	0.534***	1				
Argentina	-0.101	0.053	-0.232***	0.162**	0.270***	0.342***	0.210***	0.297***	1			
Brazil	-0.231***	0.171***	-0.183***	-0.017	0.173***	-0.054	-0.028	0.257***	0.155**	1		
Chile	-0.063	0.510***	0.002	0.018	-0.002	0.023	0.173***	0.415***	0.185***	0.290***	1	
Mexico	0.034	0.365***	0.211***	-0.303***	0.047	-0.060	0.035	-0.018	-0.236***	0.098	0.133**	1

*, ** and *** denote statistical signifficance at the 10%, 5% and 1% confidence level respectively.