

# WHY WAS THERE A PRECRISIS CAPITAL INFLOW BOOM IN SOUTHEAST ASIA?

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**Abstract:** Much of the recent literature on the East Asian crisis of 1997–98 has focused on the sudden capital reversals and the accompanying regional bust. An oft ignored fact is that the bust was preceded by a prolonged boom period. This boom was fuelled primarily by large-scale capital inflows throughout the early 1990s, a significant proportion of which was intermediated via the domestic banking sector. Motivated by this observation, along with the recognition of the importance of the credit (bank lending) transmission channel in the crisis-hit Southeast Asian economies, this paper concentrates on the precrisis capital inflow boom to emerging economies. Copyright © 2003 John Wiley & Sons, Ltd.

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## 1 INTRODUCTION

Much of the recent literature on the East Asian crisis of 1997–98 has understandably focused on the sudden capital reversals and the accompanying regional bust. However, it is often ignored that ‘at the core of the (East) Asian financial crisis were the massive capital inflows that were attracted into the region during the 1990s’ (Radelet and Sachs, 1998). Table 1 summarizes the magnitude of private capital inflows into these emerging economies and their macroeconomic consequences.<sup>1</sup> Focusing on the pre-1997 financial crisis capital inflow boom in Southeast Asia (SEA), the ‘other investment’ category, which includes short- and long-term credits (including use of IMF credit), as well as currency and deposits and other accounts receivable and payable, constituted about 75 per cent of the

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<sup>1</sup>During the inflow episode, the growth rates of the regional economies were on average around 3 per cent higher annually than the rates during the immediately preceding period of equal length. In addition, the economies experienced neither a substantially more rapid inflation rate nor a significant further deterioration of the current account deficit (except for Mexico) during the inflow episode. The last two columns of Table 1 also show that the capital inflows triggered more rapid investment rates and less rapid consumption growth during the inflow episode when compared to the preceding years (Lopez-Mejia, 1999).

Table 1. Macroeconomic consequences of capital inflows (per cent)

Inflow episode	Cumulative inflows at end of episode <sup>a</sup>	Maximum annual inflow <sup>a</sup>	Average annual GDP growth <sup>b</sup>	Average annual inflation rate <sup>b</sup>	Current account deficit <sup>a</sup>	Change in reserves <sup>b,c</sup>	Investment <sup>a,b</sup>	Consumption <sup>a,b</sup>
Indonesia 1990–95	8.3	3.6	2.2	1.3	0.2	-0.6	5.7	-0.6
Malaysia 1989–95	45.8	23.2	4.0	1.4	2.9	-2.8	4.8	-2.8
Philippines 1989–95	23.1	19.9	2.2	-3.1	0.7	-2.5	1.7	-2.5
Thailand 1988–95	51.5	12.3	3.9	-1.1	2.3	-3.3	13.4	-3.3
Mexico 1989–94	27.1	8.5	2.9	-74.4	7.1	0.0	2.4	0.0

Notes: <sup>a</sup>as per cent of GDP; <sup>b</sup>change from immediately preceding period of equal length; <sup>c</sup>minus sign denotes a rise and vice versa.

Sources: Lopez-Mejia (1999) and World Bank (1997).

Table 2. Net capital flows (per cent of GDP), 1989–96

	1991	1992	1993	1994	1995	1996	Simple average <sup>b</sup>
Indonesia							
Private capital flows	4.6	2.5	3.1	3.9	6.2	6.3	5.1
Direct investment	1.2	1.2	1.2	1.4	2.3	2.8	1.7
Portfolio investment	0.0	0.0	1.1	0.6	0.7	0.8	0.5
Other investment	3.5	1.4	0.7	1.9	3.1	2.7	3.0
Official flows	1.1	1.1	0.9	0.1	-0.2	-0.7	0.7
Change in reserves <sup>a</sup>	-2.4	-3.0	-1.3	0.4	-0.7	-2.3	-1.7
Malaysia							
Private capital flows	11.2	15.1	17.4	1.5	8.8	9.6	10.2
Direct investment	8.3	8.9	7.8	5.7	4.8	5.1	7.2
Portfolio investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other investment	2.9	6.2	9.7	-4.2	4.1	4.5	2.9
Official flows	0.4	-0.1	-0.6	0.2	-0.1	-0.1	0.0
Change in reserves <sup>a</sup>	-2.6	-11.3	-17.7	4.3	2.0	-2.5	-5.1
Philippines							
Private capital flows	1.6	2.0	2.6	5.0	4.6	9.8	4.1
Direct investment	2.0	1.3	1.6	2.0	1.8	1.6	1.8
Portfolio investment	0.3	0.1	-0.1	0.4	0.3	-0.2	0.2
Other investment	0.2	0.6	1.1	2.5	2.4	8.5	2.1
Official flows	3.3	1.9	2.3	0.8	1.4	0.2	2.0
Change in reserves <sup>a</sup>	-2.3	-1.5	-1.1	-1.9	-0.9	-4.8	-1.8
Thailand							
Private capital flows	10.7	8.7	8.4	8.6	12.7	9.3	11.5
Direct investment	1.5	1.4	1.1	0.7	0.7	0.9	1.6
Portfolio investment	0.0	0.5	3.2	0.9	1.9	0.6	1.4
Other investment	9.2	6.8	4.1	7.0	10.0	7.7	8.5
Official flows	1.1	0.1	0.2	0.1	0.7	0.7	0.1
Change in reserves <sup>a</sup>	-4.3	-2.8	-3.2	-3.0	-4.4	-1.2	-4.3

Notes: <sup>a</sup>minus sign denotes a rise and vice versa; <sup>b</sup>1989 to 1996.

Source: IMF.

private capital inflows on average in the case of Thailand.<sup>2</sup> This was also the single largest component of capital flows in the cases of Indonesia and the Philippines. Malaysia was the only exception, with direct investment constituting some 70 per cent of total capital inflows on average (Table 2).

The incentive for the foreign lending boom seems clear from the significant and sustained interest rate premia offered by the crisis-hit SEA economies over the LIBOR rate, on the one hand, and the stable exchange rate regimes maintained by the regional economies, on the other (Tables 3 and 4). The rapid monetary growth in the region during the boom period suggests that the effects of capital inflows were not being fully sterilized.<sup>3</sup>

<sup>2</sup>The inflows were particularly great in Thailand which consciously encouraged such capital inflows with the establishment of the Bangkok International Banking Facility (BIBF) in early 1993. Financial institutions under the BIBF were authorized to accept deposits and loans from abroad in foreign currency and extend loans to both overseas—but mainly—local markets (so called 'out-in' lending) and engage in cross-currency foreign exchange trading and loan syndication. Foreign capital inflows were encouraged by the fact that loans through BIBF were exempt from the withholding tax (of 10 per cent). The BIBF institutions also benefited from reduced corporate income tax rates (10 per cent as opposed to 30 per cent) and exemptions from stamp duties, the permanent establishment tax, and a number of sales taxes (Rajan, 2001).

<sup>3</sup>Of course, this does not preclude monetary sterilization from exacerbating the situation (Montiel and Reinhart, 1999).

Table 3. Interest spread in southeast Asia (per cent), 1990–96

	1990	1991	1992	1993	1994	1995	1996	Simple average
Indonesia	12.38	19.24	19.83	16.95	12.17	12.61	13.42	15.23
Malaysia	-1.28	1.84	5.11	5.41	2.02	1.39	3.11	2.51
Philippines	15.67	16.78	15.28	11.04	9.47	8.44	9.06	12.25
Thailand	5.97	9.11	7.97	7.53	5.31	7.01	7.62	7.22

Note: <sup>a</sup>Measured as difference between local lending rate and one-year LIBOR offer rate on \$.

Source: Calculated from IMF data.

As such, the reason for the interest rate premia or 'super premia' (McKinnon, 1999) in SEA appears to be an important anomaly that requires explanation.<sup>4</sup>

McKinnon (1999) and Corden (1999) have both suggested that these interest rate differentials may have been due to the existence of some kind of 'Peso problem', i.e. a small probability of large devaluation. However, this conclusion is far from universally accepted. For instance, Chang and Velasco (1998) have made the following important point:

(T)here was, as we know ex-post, a non-trivial risk of nominal and real devaluations, but government words and deeds lead investors to underestimate such a risk. Economists often fret about exchange rate pegs that lack credibility; by contrast, Asian pegs seem to have enjoyed too much credibility (p. 34).

Accordingly, one probably needs to look elsewhere for an explanation of the 'interest premium puzzle' in SEA.

An important clue to this puzzle was provided by Folkerts-Landau and Associates (1995) in their—almost prescient—review of international capital flows and the domestic financial sectors in the region. As they concluded:

The ability of banks to accumulate foreign liabilities or domestic liabilities denominated in foreign currency was improved as part of the early deregulation process.

Table 4. Exchange rates statistics, 1990–96

	Domestic currency per \$ rate in 1990		Domestic currency per \$ rate in 1996		Exchange rate variability (1990–96) <sup>a</sup>	
	End of period	Period average	End of period	Period average	End of period	Period average
Indonesia	1901.0	1842.8	2383.0	2342.3	18.94	18.78
Malaysia	2.7105	2.7049	2.5290	2.5159	0.00	0.00
Philippines	28.000	24.311	26.288	26.216	0.13	0.13
Thailand	25.520	25.114	25.610	25.487	0.00	0.00

Notes: <sup>a</sup>coefficient of variation for the entire period 1990–96.

Source: Calculated from IMF data.

<sup>4</sup>For instance, commenting on the interest differential between Thai rates and the international ones (on dollar loans) despite an open capital account, Thai economist Siamwalla (1997) noted that '(t)his differential refused to go away with the influx of foreign money even when the cost of forward cover is included, for reasons that are still not clear to me' (p. 4). Fischer (1993) emphasized this persistent interest premium as one of the 'puzzling features of the financial reforms in the Southern Cone countries'.

Capital inflows were . . . encouraged by the relatively high interest rates that prevailed in the region. Although specific causes differed among countries, high interest rates were a direct result of such factors as monetary tightening, interest rate deregulation, the encouragement of competition among financial institutions, and the relatively high costs of intermediation (p. 41).

The emphasis on banks is warranted in view of the dominance of banks (and near-banks) relative to the bond and equity markets in the provision of credit in SEA (Rajan, 1999). Accordingly, in order to examine the role of monetary policy in these bank-based systems, the obvious starting point would be the strand of macroeconomic literature which emphasizes the importance of bank lending and financial factors in explaining economic fluctuations.<sup>5</sup>

The remainder of this paper is organized as follows. The next section offers more systematic and formal evidence regarding the interest premium puzzle by examining interest rate spreads between the three-month commercial deposit rates of the SEA economies over international rates during the period leading up to the crisis. Having formally illustrated the existence and economic and statistical significance of the interest premium puzzle, Section 3 develops a simple model in an attempt to explain it. The framework, which explicitly incorporates the role of bank intermediation and the credit transmission channel, is an open economy extension of Bernanke and Blinder (1988). The model is then applied to the case of the SEA economies. The final section offers a few concluding remarks. Two annexes (A and B) which complement the empirical and theoretical models used in Sections 2 and 3, respectively, follow the main text.

## 2 INTEREST RATE ARBITRAGE

On examining the impact of financial deregulation on the real economy in Indonesia, Inamura and Yoh (1994) uncovered a rise in the share of bank deposits being placed in a short-term maturity instrument (such as the fixed three-month deposit) at the later stage of financial liberalization in the country. A similar trend is apparent for the other SEA economies. By placing their assets in a short-term maturity, investors positioned themselves to take advantage of frequently changing interest rates and protected their investments from adverse fluctuations in the local currencies.<sup>6</sup>

Among the foreign banks actively placing their assets in the SEA economies, banks from Japan, France, Germany, the United Kingdom (UK) and the United States (US)—World-5—were found to have been the largest sources of bank loans throughout the 1990s (Table 5). The size of loans/deposits from these banks to the SEA economies remained stable until mid-1997. The high rate of returns offered by the SEA banks has been one of

<sup>5</sup>For some recent work documenting the importance of this credit transmission channel in selected emerging economies, including Indonesia and Thailand, see the collection of papers in BIS (1998). For further evidence in the case of Indonesia, see Agung (1998). Brunner and Kamin (1998) emphasize the importance of this transmission channel in another bank-based system in Japan and the rest of East Asia. There is, a large literature focusing on the US. For instance, see the collection of papers in Peek and Rosengren, eds (1995) and the symposium in the *Journal of Economic Perspectives* 9 (Fall 1995).

<sup>6</sup>Active intervention by the local monetary authority in the foreign exchange markets often triggered fluctuations in the level of key interest rates (including the three-month deposit rate) in SEA economies. Siregar (1999) explores this issue in the Indonesian context while Siregar and Rajan (2002) discuss the implications of exchange rate volatility on the Indonesian external sector.

Table 5. Asia-5: nationality of BIS reporting banks providing loans, 1997–99 (millions of US dollars)

	Japan	France	Germany	UK	USA	Total
<i>End June 1997</i>						
Indonesia	23153	4787	5610	4332	4591	58273
Malaysia	10489	2934	5716	2818	2400	28820
Philippines	2109	1678	1991	1076	2816	14115
Thailand	37749	5089	6028	2361	4008	69382
Korea	23732	10070	10794	6064	9964	103432
ASIA-5	97232	24558	30139	16651	23779	274022
Asia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<i>End December 1997</i>						
Indonesia	22018	4773	6174	4492	4893	58211
Malaysia	8551	2883	7197	2014	1787	27333
Philippines	2624	2165	2999	1607	3225	19715
Thailand	33180	4718	6028	2361	2533	58534
Korea	20278	11135	9616	6924	9531	93364
ASIA-5	86651	25674	32014	17398	21969	257157
Asia	114745	42856	48656	32287	29444	378700
<i>End June 1998</i>						
Indonesia	19030	4009	7542	3967	3226	50268
Malaysia	7905	2391	5160	1613	1149	23024
Philippines	2308	1780	2161	1775	3025	17803
Thailand	26120	3943	5286	2088	1757	46801
Korea	18934	7913	8400	5634	7409	72444
ASIA-5	74297	20036	28549	15077	16566	210340
Asia	98544	35373	42240	30156	22609	324811
<i>End June 1999</i>						
Indonesia	14043	3967	7542	3428	3724	43764
Malaysia	6056	2225	2837	2837	1074	18623
Philippines	2263	1996	2689	1760	2912	16521
Thailand	18278	2922	4632	1476	1232	34694
Korea	15018	8752	7605	4685	6420	63482
ASIA-5	55658	19862	25305	14186	15362	177084
Asia	74824	35535	44168	25927	22687	286970

Source: BIS, Consolidated International Banking Statistics, various issues.

the primary incentives for the World-5 banks to invest their assets in the Southeast Asian economies.

Using the classical approach of Uncovered Interest Parity (UIP) model Equation (1), we estimate the average interest rate spreads between the three-month deposit rate of the SEA economies and the rates on similar instruments offered by banks in the World-5 economies.<sup>7</sup>

$$UID_t = i_t - i_t^* - \Delta S_{t+k}^e \quad (1)$$

( $UID_t$ ) is the uncovered interest differential.  $i_t$  is the home country's 3-month commercial deposit interest rate (Indonesia, Malaysia, Philippines and Thailand).  $i_t^*$  is the foreign

<sup>7</sup>Refer to Annex A for the steps to obtain Equation (1).

country's three-month commercial deposit interest rate (Japan, Germany, UK and USA).  $\Delta S_{t+k}^e = (S_{t+k}^e - S_t)/S_t$  is the expected proportionate appreciation/depreciation of the foreign currency (if it is positive/negative). If  $UID > 0$ , the expected rate of return on home assets is higher than foreign assets, resulting in capital inflows into the home country. Similarly, outflows take place if  $UID < 0$ .

Several interesting findings warrant highlighting.

Table 6 reveals the overall interest spreads between the two groups of economies during the two observation periods: (i) January 1991–January 1997; (ii) January 1995–January 1997. For each three-month maturity, an average uncovered interest rate disparity (UID) ranges from 1.5 to 2.6 per cent during January 1991 to January 1997 (Period A). A positive UID rate implies that the interest returns from the SEA banks were higher than those of the World-5 banks. Investors (local or foreign) in the SEA economies could on average have earned as much as 6 per cent to slightly over 10 per cent *annually* by depositing their money in the SEA banks instead of in the World-5 banks.<sup>8</sup> If we focus on the period between January 1995 and January 1997 (Period B) we find that the UID rates were even higher, ranging from 0.9 per cent to as high as 4.8 per cent *per quarter*. The decline in the domestic interest rates offered by most World-5 banks combined with the rise in the deposit rates of the SEA banks and the relatively stable SEA currencies induced the widening of the UIDs in period B, particularly for the case against the Japanese rate and the German rate.<sup>9</sup>

Taking a closer look at the individual UID, we find that the average UIDs in SEA *vis-à-vis* Japanese three-month deposit rates were the highest. By depositing their money in the SEA banks, Japanese-based investors were able to earn as much as 2.6 per cent or 4.8 per cent more for each three-month term during period A or period B, respectively, than if they had placed their money in the commercial banks in Japan. As for the UID against the German and French banks, the SEA rates offered 2.6 and 3.2 per cent more, respectively, during the two year period leading to the East Asian financial crisis (Period B). The UID against UK three-month deposits were slightly higher than the UID against the US rates.

A further interesting aspect that is revealed from the UID has been the stability of the spread (Table 7). Applying the standard ADF-Unit Root test to all UIDs reported in Table 6, we find two contrasting sets of results.<sup>10</sup> For period A, with the exception of UID against UK (no data exists to compute the UID against France), all UIDs were stationary at the first difference—I(1). During period B, UIDs against Japan, Germany and UK were all stationary at the I(0) level. Against the US, we find non-stationarity in the Indonesian and the Philippines cases. As for UIDs against France, the Indonesian and the Thai cases are non-stationary.

What does this tell us? From the unit-root test results we are able to conclude that the UID rates were on average larger during period B (compared with period A), and the fluctuations in the spread rates had generally become more stable. This implies that the 'likelihood' that World-5 investors would on average *not* earn an extra 1 to 5 per cent per each three-month maturity term during the two years period before the outbreak of the 1997 East Asian crisis was rather small. This incentive factor partly determined the rise in the accumulation of loans from the World-5 banks to the SEA economies. As far as

<sup>8</sup>For example, given an average 1.5 per cent spread offered by the SEA banks (over the World-5 banks) per quarter, an investor could gain an additional 6 per cent return if she stays for a full year.

<sup>9</sup>Between January 1995 and January 1997, the nominal exchange rates of the SEA currencies have appreciated against the yen, but depreciated against the rest of the world major currencies included in the study.

<sup>10</sup>Consistent results are found from the Phillips-Perron unit-root test. These results are available upon request.

Table 6. Uncovered interest arbitrage ( $UID_t = i_t^* - \Delta S_{t+k}^e$ )

	Indonesia		Malaysia		Philippines		Thailand		Average	
	Period A(%)	Period B(%)	Period A(%)	Period B(%)	Period A(%)	Period B(%)	Period A(%)	Period B(%)	Period A(%)	Period B(%)
Against ( $i_t^{US}$ ) <sup>a</sup>										
Mean	2.2	1.8	0.8	0.5	1.9	0.4	1.1	0.7	1.5	0.9
Median	2.0	1.6	1.2	0.3	1.9	0.8	1.2	0.7	1.6	0.9
Standard Dev.	0.9	0.6	2.6	1.9	4.0	1.5	0.9	0.9	2.1	1.2
Against ( $i_t^{JPV}$ ) <sup>b</sup>										
Mean	5.9	4.9	1.1	4.7	2.1	4.5	1.3	4.9	2.6	4.8
Median	6.8	5.8	1.5	5.1	3.7	5.5	1.5	5.8	3.4	5.6
Standard Dev.	7.8	6.9	5.9	6.3	8.0	8.4	5.7	6.9	6.9	7.2
Against ( $i_t^{Ger}$ ) <sup>c</sup>										
Mean	2.1	4.1	0.8	2.8	1.9	2.7	1.1	3.0	1.5	3.2
Median	2.6	4.6	0.5	3.3	2.3	3.9	1.6	4.0	1.8	4.0
Standard Dev.	6.1	4.2	5.6	4.5	6.9	5.2	5.4	3.6	6	4.4
Against ( $i_t^{UK}$ ) <sup>d</sup>										
Mean	2.4	1.9	1.1	0.6	2.2	0.6	1.3	0.9	1.8	1
Median	1.8	2.1	0.5	1.1	2.3	1.4	0.7	1.7	1.3	1.6
Standard Dev.	5.9	3.1	5.7	3.9	6.6	3.5	5.5	3.2	5.9	3.4
Against ( $i_t^{Fr}$ ) <sup>e</sup>										
Mean	N/A	3.5	N/A	2.2	N/A	2.2	N/A	2.5	N/A	2.6
Median	N/A	3.7	N/A	2.1	N/A	2.8	N/A	2.6	N/A	2.8
Standard Dev.	N/A	3.7	N/A	4.1	N/A	4.6	N/A	3.1	N/A	3.9

Note: <sup>a</sup>US 3-month commercial rate; <sup>b</sup>Japan 3-month commercial rate; <sup>c</sup>Germany 3-month commercial rate; <sup>d</sup>UK 3-month commercial rate; <sup>e</sup>France 3-month commercial rate; Period A: January 1991–January 1997; Period B: January 1995–January 1997; N/A: Not Available.



Table 7. Stability test (ADF-unit root test)

	Indonesia (IND)		Malaysia (MAL)		Philippines (PH)		Thailand (THAI)		Remarks	
	Period A	Period B	Period A	Period B	Period A	Period B	Period A	Period B	Period A	Period B
	Against ( $t^{US}$ ) $UID_t$ ( $UID_t - UID_{t-1}$ )	-1.8118 (3) <sup>d</sup> -5.1270 (1) <sup>e</sup>	-1.9972 (1) <sup>d</sup> -3.7178 (1) <sup>e</sup>	-4.3767 (5) <sup>d</sup>	-4.2729 (2) <sup>e</sup>	-2.5298 (3) <sup>d</sup> -8.9649 (2) <sup>e</sup>	-1.9489 (4) <sup>d</sup> -6.5037 (3) <sup>e</sup>	-2.3927 (7) <sup>d</sup> -5.1891 (7) <sup>e</sup>	-2.7598 (1) <sup>e</sup>	All I(1), except Malaysia I(0)
Against ( $t^{PN}$ ) $UID_t$ ( $UID_t - UID_{t-1}$ )	-1.6775 (6) <sup>e</sup> -6.5242 (5) <sup>e</sup>	-3.9442 (2) <sup>d</sup>	-1.5948 (6) <sup>e</sup> -6.3849 (5) <sup>e</sup>	-4.5253 (2) <sup>d</sup>	-2.3688 (6) <sup>e</sup> -6.1943 (5) <sup>e</sup>	-5.0488 (2) <sup>d</sup>	-1.7862 (6) <sup>e</sup> -6.3291 (5) <sup>e</sup>	-4.7079 (2) <sup>e</sup>	All I(1)	All I(0)
Against ( $t^{K}$ ) $UID_t$ ( $UID_t - UID_{t-1}$ )	-1.4421 (6) <sup>e</sup> -8.2359 (5) <sup>e</sup>	-3.7019 (1) <sup>d</sup>	-1.9598 (6) <sup>e</sup>	-3.7526 (1) <sup>d</sup>	-1.5208 (8) <sup>e</sup> -5.8079 (8)	-4.8389 (1) <sup>d</sup>	-1.0494 (8) <sup>e</sup> -3.8019 (8) <sup>e</sup>	-3.8400 (1) <sup>d</sup>	All I(1), except Malaysia I(0)	All I(0)
Against ( $t^{K}$ ) $UID_t$ ( $UID_t - UID_{t-1}$ )	-2.6296 (6) <sup>d</sup> -5.5391 (6) <sup>e</sup>	-3.1436 (2) <sup>d</sup>	-2.6261 (6) <sup>e</sup>	-1.9726 (3) <sup>e</sup>	-3.3667 (6) <sup>d</sup>	-4.2299 (2) <sup>e</sup>	-2.4026 (6) <sup>e</sup>	-2.5307 (2) <sup>e</sup>	All I(0), Except Indonesia I(1)	All I(0)
Against ( $t^{T}$ ) $UID_t$ ( $UID_t - UID_{t-1}$ )	N/A N/A	-2.8678 (1) <sup>d</sup> -4.9838 (1) <sup>e</sup>	N/A N/A	-2.9991 (2) <sup>d</sup>	N/A N/A	-4.3617 (1) <sup>d</sup>	N/A N/A	-2.9274 (1) <sup>d</sup> -4.9126 (1) <sup>e</sup>	N/A	I(1) for IND & THAI. I(0) for MAL & PH.

Note: <sup>a</sup>(0) shows the number of lags –based on Akaike information Criterion; <sup>d</sup>/ with intercept only; <sup>e</sup>/ with no intercept and trend; N/A: information are not available.

individual countries are concerned for period B, Indonesia offered the largest UIDs for each World-5 bank. Thailand provided the second highest rate of UIDs, followed by Malaysia and the Philippines. The interest rate spreads reflect the general distribution of the World-5 bank loans in the SEA economies (Table 5). Thailand and Indonesia together received about \$130 billion as of end 1997, respectively. Malaysia, at a distant third, absorbed close to \$ 29 billion; inflows into the Philippines were around \$14 billion.

### 3 THE MODEL

The preceding section has documented the existence of an interest premium puzzle which in turn was the primary cause of the large-scale capital inflows (bank lending). We attempt to rationalize the existence of this interest differential in this section.

The starting point of the analysis is the Bernanke and Blinder (1988) model which explicitly incorporates a banking sector into a traditional IS-LM framework. In effect, Bernanke-Blinder relax the assumption of perfect substitutability between bonds and bank loans, hence introducing a third (banking) sector.<sup>11</sup> By so doing, while the upward sloping curve denoting money market equilibrium (LM) curve remains more or less unchanged, the curve denoting goods market equilibrium (IS) is replaced by a downward schedule. Bernanke-Blinder refer to this as the CC ('commodities and credit') curve.<sup>12</sup> Following Spiegel (1995), we consider an open economy Mundell-Fleming version of the original Bernanke-Blinder model.<sup>13</sup>

Assume that there are five agents in the economy: households (*h*), firms (*f*), banks (*b*), the government and foreign creditors. There are four domestic financial assets: in the form of money, in the form of currency and demand deposits, bank loans (*L*) and bonds (*B*). Since the focus is on the precrisis boom, we assume that the country maintains a fixed exchange rate, while goods prices are constant. Both are normalized to one.

Some discussion of the household money demand is warranted. We assume that the households have a choice between three assets, namely, money, which in turn is composed of demand deposits and cash, and a relatively less liquid financial asset in the form of government bonds. Assume demand deposits pay an interest rate (equal the bank loan rate) of  $r_t$ , and bonds pay an interest of  $i_t$ .<sup>14</sup> Since demand deposits pay non-zero interest, under 'normal' circumstances, it would be rational for individuals to maintain all their desired liquidity holdings in demand deposits rather than currency. While not explicitly modeled, we assume that in 'exceptional' circumstances, i.e. when the domestic financial system is under stress, such as during a bank panic, individuals shift all their desired liquidity holdings from deposits to cash.

<sup>11</sup>Thus, while monetary policy in the traditional IS-LM framework is referred to as the 'money view' of monetary transmission, we are interested in the 'credit view' which emphasizes the importance of bank loans.

<sup>12</sup>The microfoundations of the Bernanke-Blinder (1988) are broadly similar to other New Keynesian models (i.e. price stickiness, etc) and will not be discussed here (see Romer, 1996 for a textbook discussion).

<sup>13</sup>Spiegel's (1995) focus was on sterilization policies in the region precrisis, while this paper concentrates on the boom-bust cycle of capital flows and reversals. Other differences between Spiegel's formulation and the one developed in this paper are noted at various places in the next section.

<sup>14</sup>The assumption is that the incidence of the burden of a non-interest bearing reserve requirement (reserve tax) is faced by lenders (Reinhart and Reinhart, 1999). Of course, if faced by the depositors, the deposit rate,  $r_t^d = (1 - \tau)r_t$ .

### 3.1 Loan Market

We focus initially on the loan market equilibrium. Assume that the banks lend to firms only and firms in turn can borrow only from the banks. We abstract from the possible roles of the consumer/household and the government as net debtors. We assume that deposits are made by households.<sup>15</sup>

Demand for loans ( $L_t^d$ ) is defined in general terms as:

$$L_t^d = L^d(r_t, i_t, Y_t) \quad (2)$$

where:  $Y_t$  = real income and  $L_r^d < 0$ ,  $L_i^d > 0$  and  $L_Y^d > 0$ .

To determine the supply of loans ( $L_t^s$ ) we need to consider the constituent components of the bank's balance sheet. Assume for simplicity that households only deposit money in banks resident in the country, thus allowing us to abstract from issues relating to capital flight. Banks essentially have two sources of funds, namely, domestic deposits (by domestic households) and foreign borrowing (through interbank market). The total funds at the disposal of banks are:

$$F_t = D_t^h + K_t^* \quad (3)$$

where:  $F_t$  = total banks' liabilities;  $D_t^h$  = domestic deposits and  $K_t^*$  = stock of external debt.<sup>16</sup> For simplicity, assume that all capital inflows are intermediated through the banking system.<sup>17</sup> Assuming that banks are faced with non-zero reserve requirements ( $\tau$ ) which provides no interest, and banks do not hold any excess reserves, the bank balance accounting identity must require that:

$$R_t = \tau F_t = R_t^d + R_t^{K^*} \quad (4)$$

where: ( $R_t^d = \tau D_t^h$ ) and  $R_t^{K^*} = \tau K_t^*$ .  $R_t^{K^*}$  is the reserves issued by the monetary authorities to monetize capital inflows. Let  $D_t^h = D^h(r_t, i_t, Y_t)$ , with  $D_r^h > 0$ ,  $D_i^h < 0$  and  $D_Y^h > 0$ .<sup>18</sup> Assume that banks allocate the remainder of the funds to either lending (to firms) or holding bonds. In other words:

$$(1 - \tau)F_t = L_t^s + B_t^b \quad (5)$$

Assuming some share ( $\lambda$ ) of the funds is lent out, the loan supply ( $L_t^s$ ) may be written as:

$$L_t^s = (1 - \tau)\lambda(r_t, i_t)F_t \quad (6)$$

where:  $\lambda_r > 0$  and  $\lambda_i < 0$ .

<sup>15</sup>These assumptions appear consistent with the observation of financial systems in emerging economies by Rojas-Suarez and Weisbord (1995, p. 4).

<sup>16</sup>Since none of the other agents (namely, firms, government, households) undertake external borrowings,  $K_t^*$  must also equal the country's total external debt.

<sup>17</sup>This is admittedly a restrictive assumption, though plausible at least in the case of Indonesia, where the bulk of external debt was accumulated by corporates (World Bank, 1998).

<sup>18</sup>By assuming that  $D_i^h = 0$ , Bernanke-Blinder (1988) and Spiegel (1995) assume money (deposits) are completely unresponsive to changes in their own (bank) rates.

### 3.2 Loan Market Equilibrium

Equating equations (2) and (6) derives:

$$L^d(r_t, i_t, Y_t) = (1 - \tau)\lambda(\cdot)F_t. \quad (7)$$

Substituting equation (3) and (4) into (7) implies that:

$$L^d(r_t, i_t, Y_t) = (1 - \tau)\lambda(\cdot)\left(\frac{R_t^d}{\tau} + K_t^*\right). \quad (8)$$

To complete the discussion of loan market equilibrium, we are only left to explicate the capital inflows ( $K_t^*$ ) term. Capital inflows in turn are dictated by domestic versus foreign interest rate differentials (accounting for expected exchange rate depreciation), and may therefore be written as:

$$(K_t - K_{t-1}) = \Delta K_t = k(r_t - r_t^* - rp_t - \varepsilon_t), \quad (9)^{19}$$

where:  $r_t^*$  = international interest rates (on bank deposits);  $rp_t$  = country/currency risk premium; and  $\varepsilon_t$  = expected exchange rate depreciation (assumed zero henceforth given assumption of credibly fixed exchange rate precrisis). Let:

$$(r_t - r_t^* - rp_t - \varepsilon_t) = \alpha_t. \quad (10)$$

As usual, assume that  $k_\alpha > 0$ , i.e. capital inflow is an increasing function of the spread between domestic and foreign interest rates. However, note that  $k_\alpha$  is not assumed to be infinite. In other words, we assume the supply curve is assumed not to be perfectly elastic.

Rajan (1999) has developed a model which shows that perfect capital mobility may not exist in bank-based emerging economies even if capital account transactions have been deregulated, as long as the domestic banking structures in developing countries are 'inefficient' or 'uncompetitive' (relative to international best practice techniques). In other words, a clear distinction should be made between *capital account deregulation and financial sector deregulation*. As long as the domestic banking systems are not deregulated as a means of bringing financial cost structures down, capital account liberalization may still lead to an imperfectly integrated capital account (also see Bird and Rajan, 2001b).<sup>20</sup>

Substituting equations (9) and (10) into equation (8), total differentiating the modified equation (8) and solving for the bond market rate in terms of current period variables, we obtain (refer to Appendix B):

$$i_t = \phi(r_t, Y_t, \tau, R_t, r_t^*, \varepsilon_t). \quad (11)$$

where:  $\phi_r > 0$ ,  $\phi_Y < 0$ ,  $\phi_R > 0$ ,  $\phi_\tau < 0$ ,  $\phi_{r^*} > 0$  and  $\phi_\varepsilon < 0$ .

<sup>19</sup>Spiegel (1995) fails to make a distinction between foreign capital *stock* and *flows*.

<sup>20</sup>This is also consistent with the earlier quote by Folkerts Landau and Associates (1995) in Section 1 of this paper. It is therefore important to note that many of the regional economies in East Asia remained 'quite closed' to international competition in financial services despite having relaxed most controls on capital movements in the year prior to the crisis (Claessens and Glaessner, 1998).

### 3.3 External Sector

Domestic absorption ( $A_t$ ) in this framework may be simply written as:

$$A_t = A(i_t, r_t). \quad (12)$$

where:  $A_r < 0$  and  $A_i < 0$ .

In an open economy, total output equals aggregate domestic demand plus the current account balance (CAB) or:

$$Y_t = A_t + CAB = A(i_t, r_t) + T_t - r^* K_{t-1} \quad (13)$$

where:  $T_t$  = trade balance. Thus, the last two terms on the right-hand side of equation (13) refer to the CAB, and consist of the trade balance (which is a function of output) and the interest payments (on existing external debt), respectively. Holding foreign incomes and price levels constant, we may simply state that  $T_t = T(Y_t)$ , where  $T_Y < 0$ .

The balance of payments (BOP) accounting identity is:

$$T(Y_t) - r^* K_{t-1} + \Delta K_t^* = \Delta R_t^* = BP. \quad (14)$$

Equation (14) states that the current account balance plus capital inflow must equal the change in reserves.<sup>21</sup> The BOP equilibrium is simply the BP curve. Substituting equation (4) into equation (14) derives:

$$T(Y_t) = r_t^* K_t^* - (1 + r^* - \tau)k(\alpha_t). \quad (15)$$

Totally differentiating equation (15) derives:

$$(\partial r_t / \partial Y_t)_{BP} = -T_Y / (1 + r^* - \tau)k_\alpha > 0. \quad (16)$$

In other words, the BP curve is positively sloped in  $r_t - Y_t$  space.

### 3.4 Goods and Credit Market

Substituting equation (11) into equation (13) implies:

$$Y_t = A(r_t, \phi(r_t, Y_t, \tau, R_t, r_t^*, \varepsilon_t)) + T(Y_t) - r^* K_{t-1} \quad (17)$$

Following Bernanke and Blinder, equation (17) refers to the commodity-credit (CC) equilibrium. Importantly, note that the CC curve is now directly affected by credit market conditions/monetary policy. Differentiating equation (17) w.r.t.  $r_t$  derives:

$$(\partial r_t / \partial Y_t)_{CC} = (1 - A_i \phi_Y - T_Y) / (A_r + A_i \phi_r) < 0 \quad (18)$$

i.e. a downward sloping CC curve in  $r_t - Y_t$  space.

<sup>21</sup>In the case of the SEA economies on average total capital inflows (as a per cent of GDP) exceeded the corresponding current account deficit, resulting in an accumulation of international reserves (Table 1). This accumulation was particularly high in the case of Malaysia and Thailand which, along with Indonesia, was among the ten largest emerging market recipients of net private capital flows during the period under consideration (Lopez-Mejia, 1999; World Bank, 1997).

### 3.5 Money Market

Using equation (4), the money market equilibrium simply requires that the money supply must equal money demand:

$$R_t^s = \tau F_t = (R_t^d + R_t^{K*}) \tag{19}$$

Given that the foreign capital inflows component of money is not under the discretion of the authorities, we focus only on the discretionary (domestic) component. Thus, the LM curve is given by:

$$D_h(r_t, i_t, Y_t) = \frac{R_t^d}{\tau} \tag{18'}$$

Differentiating equation (18') w.r.t.  $r_t$  derives:

$$(\partial r_t / \partial Y_t)_{LM} = -[D_Y^h + D_i^h \phi_Y] / [D_r^h + D_i^h \phi_r] \tag{20}$$

In order to ensure that the LM curve is unambiguously positive, we require that

$$|D_i^h \phi_r| > D_r^h.$$

### 3.6 Overall Equilibrium

A graphical illustration of the equilibrium in the three markets is shown in Figure 1. Two points should be noted. First, that the variable on the vertical axis is the bank loan (or

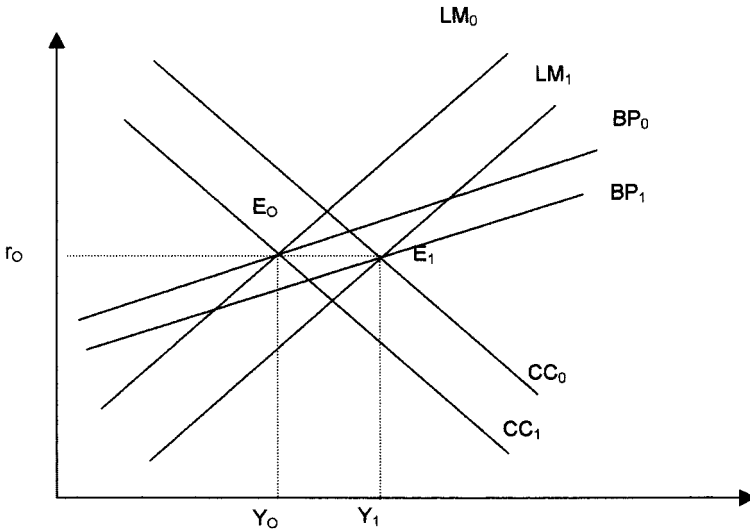


Figure 1. Fall in Risk Premium

deposit) rate, which is our focus, given the bank-dominated financial intermediation process in SEA. Second, is the maintained assumption that

$$(\partial r_t^h / \partial Y_t)_{LM} > (\partial r_t^h / \partial Y_t)_{BP} \text{ i.e. } [D_Y^h + D_i^h \phi_Y] / [D_r^h + D_i^h \phi_r] < T_Y / (1 + r^* - \tau) k_\alpha.$$

### 3.7 Capital Inflows and Sustained Interest Premium

Referring to Figure 1, assume that the economy is starting initially from the case of internal and external equilibrium ( $E_0$ ). For simplicity, let the current deficit equal zero. Thus, BOP equilibrium requires that  $\alpha_t = 0$ . Now assume some shock occurs such that  $\alpha_t > 0$ , for instance, because of a decline in risk perception of the economy (or conversely because of increased bullishness about growth prospects of the emerging economy). The induced capital inflows shift the BP curve right ( $BP_0$  to  $BP_1$ ). These capital inflows must imply a rise in reserves which, if not sterilized (or only partly so), will lead to a rightward shift of both the LM ( $LM_0$  to  $LM_1$ ) and CC ( $CC_0$  to  $CC_1$ ) curves. These shifts could lead to a new equilibrium ( $E_1$ ) which corresponds to higher output, lower interest rates, net capital inflows, rising international reserves and a current account deficit.<sup>22</sup> This is consistent with the experience of the SEA economies as suggested by the macroeconomic data summarized in Table 1. However, the impact on domestic interest rates seems ambiguous.

We can explore the effects more formally by considering some simple comparative statics of the system of equations characterizing this economy.

Substitute equation (15) into equation (17). This derives:

$$Y_t = A(r_t, \phi(r_t, Y_t, \tau, R_t, r_t^*, \varepsilon_t)) + r_t^* K_t^* - (1 + r_t^* - \tau)k(\alpha_t) - r_t^* K_{t-1}^*. \quad (21)$$

The two endogenous variables ( $Y_t$  and  $r_t$ ) may be solved using equations (17) and (20). Differentiating the two equations w.r.t.  $rp_t$  derives:

$$\begin{aligned} [(1 - \phi_Y A_i) - (A_r + \phi_r A_i - (1 + r^* - \tau)k_\alpha)] [dY_t / drp_t] &= [(A_i \phi_{rp} + (1 + r^* - \tau)k_\alpha)] \\ &[(D_Y^h + D_i^h \phi_Y) (D_r^h + D_i^h \phi_r)] [dr_t / drp_t] = [-D_r^h \phi_{rp}] \end{aligned}$$

As usual, the determinant of the first matrix on the left-hand side (LHS) ( $\Lambda$ )  $< 0$ . It is easy to see to confirm that:

$$\partial r_t / \partial rp_t = -\{ (1 - \phi_Y A_i) (D_i^h \phi_{rp}) - [(A_i \phi_{rp} + (1 + r^* - \tau)k_\alpha)] [(D_r^h + D_i^h \phi_Y)] / \Lambda \} > 0.$$

Note that as long as  $0 < \partial r_t / \partial rp_t < 1$ , even as  $rp_t \rightarrow 0$ , domestic interest rates need not fall to international levels ( $r^*$ ).

Referring to Table 3 we see that there seems to have been a general declining trend in the interest rate differentials between 1991 and 1995. This is consistent with the capital account and financial liberalization undertaken in the late 1980s and early 1990s in East Asia. Nonetheless, a substantial positive premium persisted in all the economies precrisis.

<sup>22</sup>*A priori*, it is possible that  $r_t$  will rise. However, such an equilibrium requires that, for a given increase in money supply, the LM curve shift out by less than the CC curve. Such a possibility is unlikely, since the LM curve is directly impacted by changes in R, while the CC curve is only indirectly impacted. The comparative statics that follows confirms that  $r_t$  rises with the risk premium term ( $rp_t$ ).

#### 4 CONCLUDING OBSERVATIONS

The title of this paper bears revisiting: ‘Why was there a precrisis capital inflow boom in Southeast Asia?’ We have argued that the boom was fuelled primarily by large scale bank deposits. Raw data presented in this paper reveals the existence of a sustained interest rate premium offered on deposits in the region during the pre-1997 financial crisis which stimulated large-scale bank lending. More formal empirical tests confirm the existence and persistence of positive uncovered interest rate differentials between the East Asian economies over the world rates prior to the crisis.

Standard macroeconomic theory has by and large either completely ignored the role of banks in the intermediation process (Bird and Rajan, 2001b; Calvo, 1996), or implicitly assumed it to be smoothly functioning. Neither alternative is satisfactory, particularly when the focus is on emerging economies. Motivated by Spiegel (1995), we proceeded to develop a simple open economy extension of the Bernanke and Blinder (1987) model. While this bank-centric Mundell–Fleming model is short term and static in nature, we have shown that it is able to account for the so-called interest rate premium puzzle in SEA precrisis, i.e. the sustained (non-constant) interest rate differential offered despite evidence of fairly credible *ex-ante* fixed exchange rates (Thailand and Indonesia in particular).

#### APPENDIX A: UNCOVERED INTEREST ARBITRAGE (UID)<sup>23</sup>

Due to the precrisis stability of the Southeast Asian (SEA) currencies against the US dollar during the period January 1991–January 1997 and the limited availability of forward market instruments, a large proportion of the capital inflows to the SEA economies did not have cover (i.e. were not hedged) (see Bird and Rajan, 2001a).

The basic model of UID argues that a risk-neutral investor will be indifferent to where an extra US\$ 1 is invested and uncovered interest rate parity holds when:

$$1 + i_t = \frac{(1 + i_t^*)S_{t+k}^e}{S_t} \quad (\text{A.1})$$

where:  $i_t$  is the home country’s three-month commercial deposit interest rate (Indonesia, Malaysia, Philippines and Thailand).  $i_t^*$  is the foreign country’s three-month commercial deposit interest rate. (Japan, Germany, UK and USA).  $S_t$  is the current spot exchange rate.  $S_{t+k}^e$  is the spot exchange rate expected to prevail in period  $t + k$ . The left-hand side of equation (A.1) is the per period return earned investing in domestic economy (SEA), and the right-hand side is the expected per period return from investing in the foreign financial instrument.

Equation (A.1) can be rearranged as:

$$i_t = i_t^* + \frac{S_{t+k}^e - S_t}{S_t} \quad (\text{A.2})$$

or

$$i_t = i_t^* + \Delta S_{t+k}^e \quad (\text{A.3})$$

<sup>23</sup>The analysis here draws on Hallwood and MacDonald (2000).



where:  $(\Delta S_{t+k}^e = (S_{t+k}^e - S_t)/S_t)$  is the expected proportionate appreciation of the foreign currency (if it is positive). Equation (A.3) can be further rearranged to obtain the uncovered interest differential (UID):

$$UID_t = i_t - i_t^* - \Delta S_{t+k}^e \tag{A.4}$$

If  $UID > 0$ , the expected rate of return on home assets is higher than foreign assets, resulting in capital inflows into the home country. Similarly, outflows take place if  $UID < 0$ .

For our computations of the interest rate spread that prevailed in SEA during 1991–97, we compare three-month commercial deposit rate offered in domestic banks of each SEA with deposit rates of a similar instrument in France, Germany, Japan, United Kingdom (UK) and the United States (US). All series are on a monthly basis.

Since we are dealing with the three-month maturity and each of the reported three-month deposit rates are for a full one year rate of return, we make the necessary adjustment by multiplying each of the rate by 0.25 (so as to ensure that we deal with each individual three-month maturity term). In addition, given the lack of monthly (or even quarterly) data on the expected spot exchange rate prevailing in  $(t + 3)$ —three months from period  $t$ —is proxied by the currency’s actual spot nominal exchange rate at  $(t + 3)$ .<sup>24</sup> So our UID rates are the actual *ex-post* rates of interest differential received by the investors at the end of three months maturity period. The uncovered interest differentials are reported in Table 6.

**APPENDIX B: THE THEORETICAL MODEL**

To generate Equation (11), we first substitute equations (9) and (10) into equation (8) and obtain:

$$L^d(r_t, i, Y_t) = (1 - \tau)\lambda(\cdot)(R_t^d/\tau + k(\alpha_t) + K_{t-1}). \tag{B.1}$$

Totally differentiating equation (B.1) derives:

$$di[L_i^d - (1 - \tau)\lambda_i F_t] = dr[-L_r^d - (1 - \tau)\lambda_r F_t + (1 - \tau)\lambda(\cdot)k_\alpha] - dY[L_Y^d] - [d_r^* + d\varepsilon + drp](k_\alpha)(1 - \tau)\lambda(\cdot) - d\tau(R/\tau^2)\lambda(\cdot) \tag{B.2}$$

From equation (B.2), we can solve for the bond market rate in terms of current period variables:

$$i_t = \phi(r_t, Y_t, \tau, R_t, r_t^*, \varepsilon_t) \tag{11}$$

where:  $\phi_r > 0$ ,  $\phi_Y < 0$ ,  $\phi_R > 0$ ,  $\phi_\tau < 0$ ,  $\phi_{r^*} > 0$  and  $\phi_\varepsilon < 0$ .

<sup>24</sup>This step is commonly applied for the developing country studies (for instance, see Khalid, 1999). Note given the rigid exchange rate policies (against the US\$) of the SEA, one can also argue that investor should be able to accurately estimate the size of  $\Delta S_{t+k}^e$ .

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