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**CAPITAL FLOWS, CREDIT TRANSMISSION
AND THE CURRENCY CRISIS IN SOUTHEAST ASIA**

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November 1999

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ABSTRACT**CAPITAL FLOWS, CREDIT TRANSMISSION
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The capital outflow and accompanying bust in Southeast Asia in 1997 and 1998 was preceded by a prolonged boom period. This boom was fuelled primarily by large scale capital inflows all through the early 1990s, a significant proportion of which was intermediated through 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 explores the boom and bust cycle of capital inflows to and reversals from these economies

Key words: banks, capital flows, currency crisis, interest rates, Southeast Asia

JEL Classification: F32, F41

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CAPITAL FLOWS, CREDIT TRANSMISSION AND THE CURRENCY CRISIS IN SOUTHEAST ASIA

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1. Background and Introduction

Capital inflow booms were precursors to the recent currency crises in emerging economies in Southeast Asia (1997-98) and Mexico (1994-95). This is clearly evident from Table 1, which reveals the magnitude of private capital inflows to these emerging economies as well as their macroeconomic consequences. Focussing on the capital inflow boom in Southeast Asia (SEA) precrisis, 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 percent of the private capital inflows on average in the case of Thailand (Table 2). This was also the largest single component of capital flows in the cases of Indonesia and the Philippines. Malaysia was the only exception, with direct investment constituting some 70 percent of total capital inflows on average.

Table 1
Macroeconomic Consequences of Capital Inflows (%)

	Inflow Episode	Cumulative Inflows ^a at end of episode	Mean Ratio ^b	GDP growth ^c	Inflation Rate ^c	Current Account Deficit ^{a,b}	Change in Reserves ^{b,c,d}	Investment ^{a,c}	Consumption ^{a,c}
Indonesia	1990-95	8.3	1.8 (3.6)	2.2	1.3	0.2	-0.6	5.7	-0.6
Malaysia	1989-95	45.8	9.4 (23.2)	4.0	1.4	2.9	-2.8	4.8	-2.8
Philippines	1989-95	23.1	4.3 (19.9)	2.2	-3.1	0.7	-2.5	1.7	-2.5
Thailand	1988-95	51.5	9.9 (12.3)	3.9	-1.1	2.3	-3.3	13.4	-3.3
<u>Memo Item</u> Mexico	1989-94	27.1	5.3 (8.5)	2.9	-74.4	7.1	0.0	2.4	0.0

Notes: a) as percent of GDP
b) figures in parenthesis refer to maximum annual inflow
c) change from immediately preceding period of equal length
d) minus sign denotes a rise and vice versa

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

Table 2
Net Capital Flows (% of GDP), 1989-96

	1991	1992	1993	1994	1995	1996	Simple Average ^b
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 ^a	-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 ^a	-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 ^a	-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 ^a	-4.3	-2.8	-3.2	-3.0	-4.4	-1.2	-4.3

Notes: a) minus sign denotes a rise and vice versa

b) 1989 to 1996

Source: IMF

These capital inflows were correspondingly associated with a sharp rise in broad money (M2) in the SEA economies (Table 3)¹. 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 they maintained, on the other (Table 4). To be sure, the Thai baht and Malaysian ringgit were extremely stable relative to the \$. Measured in terms of the coefficient of variation (CV), the

¹ The ratio of M2 to international reserves is the inverse of the degree to which liquid domestic liabilities of the banking system are supported by foreign reserves. There is a large body of empirical evidence that suggests that a high and growing M2 to reserves ratio may be an

Indonesian rupiah seems to have been relatively volatile. However, Indonesia followed an explicit exchange rate policy of allowing the rupiah to depreciate about 4 to 5 percent on average relative to the \$ in order to compensate for inflation rate differentials between Indonesia and the US.

Table 3
Money and Credit (%), 1992-96

Country	1992	1993	1994	1995	1996
<u>Indonesia</u>					
M2/GDP	45.8	43.4	44.9	48.3	52.5
M2 growth ^a	19.8	20.2	20.0	27.2	27.2
M2/Reserves	5.6	6.1	6.6	7.1	6.5
<u>Malaysia</u>					
M2/GDP	78.9	90.6	88.9	92.7	97.8
M2 growth ^a	29.2	26.6	12.7	20.0	21.8
M2/Reserves	2.6	2.1	2.5	3.3	3.3
<u>Philippines</u>					
M2/GDP	36.2	42.1	45.7	50.4	54.0
M2 growth ^a	13.6	27.1	24.4	24.2	23.2
M2/Reserves	4.4	4.9	4.9	5.9	4.5
<u>Thailand</u>					
M2/GDP	74.8	78.9	78.5	80.8	79.9
M2 growth ^a	15.6	18.4	12.9	17.0	12.6
M2/Reserves	4.1	4.1	3.8	3.7	3.9

Notes: a) growth refers to annual average

Sources: Sachs and Radelet (1998a,b)

Table 4
Interest Spread in Southeast Asia (%)^a, 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: a) Measured as difference between local lending rate and one-year LIBOR offer rate on \$

Source: Calculated from IMF data

early warning of impending monetary and financial difficulties (see for instance, Kaminsky and Reinhart, 1996, Rodrik and Velasco, 1999 and Sachs et al., 1996a,b).

The rapid monetary growth in the region during the boom period suggests that the effects of capital inflows were not being fully sterilized. As such, the reason for the interest rate premia - or “super premia” as McKinnon (1999) refers to them as - in SEA, is an anomaly to be explained. 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 (1998, p.4) noted:

(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.”²

McKinnon (1999) and Corden (1999) have both suggested that these 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, p.34) have made the important point that:

there was, as we know ex-post, a non-trivial risk of nominal and real devaluations, but government words and deeds 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.

This observation is particularly true of Thailand which had a recent history of sound macroeconomic policies, with the last devaluation of the baht against the \$ being sometime in 1984, and it was generally acknowledged/felt that the country was well on its way to joining the ranks of the industrialized economies in the region such as Singapore and Hong Kong. Accordingly, one probably needs to look elsewhere for a rationalization of the “interest premium puzzle” in SEA.

An important clue to this puzzle was provided by Folkerts-Landau and Associates (1995, p.41) in their - almost prescient - review of capital flows and the domestic financial sectors in the region. They drew the conclusion that:

(t)he ability of banks to accumulate foreign liabilities or domestic liabilities denominated in foreign currency was improved as part of the early deregulation process. 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,

² It is interesting to note also that Fischer (1993) emphasized this persistent interest premium as one of the “puzzling features of the financial reforms in the Southern Cone countries.”

interest rate deregulation, the encouragement of competition among financial institutions, and the relatively high costs of intermediation.

Their emphasis on banks is warranted, given the dominance of banks (and ‘near-banks’) relative to the bond and equity markets in the provision of credit in SEA (Table 5). Indeed, the boom-bust cycle in East Asia was caused by bank lending³. 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 (the so-called credit channel of monetary policy transmission)⁴.

Table 5
Exchange Rates Statistics, 1990-96

	Domestic Currency Per \$ Rate in 1990		Domestic Currency Per \$ Rate in 1996		Exchange Rate Variability (1990-96) ^a	
	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: a) coefficient of variation for the entire period 1990-96

Source: Calculated from IMF data

Road Map of the Paper

The remainder of this paper is organized as follows. Drawing on Bernanke and Blinder (1988) and Spiegel (1996), the next section develops a simple Keynesian model which

³ To be sure, of the net capital reversal from the five crisis-hit East Asian economies (Indonesia, Thailand, South Korea, Philippines and Malaysia) of some \$130 billion between 1996 and 1998, about \$100 billion was due to reversals in net (short term) lending by commercial banks. Reversals in portfolio equity investments averaged about \$10 billion or about 10 percent of bank lending during this period (IIF, 1999).

⁴ For some recent work documenting the importance of the credit transmission channel in selected emerging economies, including Indonesia and Thailand, see the collection of papers in BIS (1999). 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 East Asia, Japan. There is, a large literature focussing on the US. See, for instance, the collection of papers in Peek and Rosengren, eds. (1995) and the symposium in the Journal of Economic Perspectives (Volume 9, Fall 1995).

explicitly incorporates the role of bank intermediation and the credit transmission channel. The model is then applied to the case of SEA: section 3 focuses on the capital inflow boom, while section 4 explores issues relating to the onset of the crisis and capital reversals. The final section concludes the paper.

2. The Model

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) sector⁵. 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 - what they refer to as - a CC (“commodities and credit”) curve⁶. Following Spiegel (1996), we consider an open economy Mundell-Fleming version of the original Bernanke-Blinder model⁷.

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.

⁵ 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.

⁶ The “microfoundations” of the Bernanke-Blinder 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). See Calvo and Reinhart (1999) and Krugman (1999) for recent discussions of Keynesian-type channels/frameworks to explain currency inflows and reversals.

⁷ Spiegel's (1996) 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 (as well as the conclusions) are noted at various places in the next section.

Some discussion of the household money demand is warranted. We assume that the households have a choice between three assets – money, which 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^8 , and bonds pay an interest of i_t . 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 currency⁹. On the other hand, while not explicitly modeled, 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 (see section 4).

Loan Market

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 households¹⁰.

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

$$L_t^d = L^d(r_t, i_t, Y_t), \quad (1)$$

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

⁸ 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) = $(1 - \tau)r_t$.

⁹ Also see Calvo and Vegh (1990) who develop the microfoundation of a broadly similar household setup (with three financial assets), assuming the existence of a “liquidity in advance constraint”.

banks resident in the country, thus allowing us to abstract from issues relating to capital flight. Banks essentially have two sources of funds, viz. domestic deposits (by domestic households) and foreign borrowing (through interbank market). The total funds at the disposal of banks are:

$$F_t = D_t^h + K_t^* \quad (2)$$

where: F_t = total banks' liabilities; D_t^h = domestic deposits and K_t^* = stock of external debt¹¹. For simplicity, assume that all capital inflows are intermediated through the banking system¹². Assuming that banks are faced with non-zero reserve requirements (τ) - which provides no interest - and banks do not hold any excess reserves, the bank balance accounting identity must require that:

$$R_t = \tau F_t = R_t^d + R_t^{K^*} \quad (3)$$

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 $D_Y^h > 0$ ¹³. Assume that banks allocate the remainder of the funds to either lending (to firms) or holding bonds. In other words:

$$(1-\tau)F_t = L_t^s + B_t^b \quad (4)$$

¹⁰ These assumptions are consistent with the observation of financial systems in emerging economies by Rojas-Suarez and Weisbord (1995, p.4).

¹¹ Since none of the other agents (viz. firms, government, households) undertake external borrowings, K_t^* must also equal the country's total external debt.

¹² Admittedly, this is a restrictive assumption, and least plausible in the case of Indonesia, where the bulk of external debt was accumulated by corporates (World Bank, 1998).

¹³ By assuming that $D_i^h = 0$, Bernanke-Blinder and Spiegel assume money (deposits) are completely unresponsive to changes in their own (bank) rates.

Assuming some share (λ) of the funds is lent out, the loan supply (L^s) may be written as:

$$L_t^s = (1-\tau)\lambda(r_t, i_t)F_t \quad (5)$$

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

Loan Market Equilibrium

Equating eqs. (1) and (5) derives:

$$L^d(r_t, i_t, Y_t) = (1-\tau)\lambda(\cdot)F_t. \quad (6)$$

Substituting eq. (2) and (3) into (6) implies that:

$$L^d(r_t, i_t, Y_t) = (1-\tau)\lambda(\cdot)(R_t^d/\tau + K_t^*). \quad (7)$$

To complete the discussion of loan market equilibrium, one is 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:

$$(K_t - K_{t-1}) = \Delta K_t = k(r_t - r_t^* - rp_t - \varepsilon_t), \quad (8)^{14}$$

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

¹⁴ Spiegel fails to make a distinction between foreign capital *stock* and *flows*.

$$(r_t - r_t^* - rp_t - \varepsilon_t) = \alpha_t. \quad (9)$$

As usual, assume that $k_\alpha > 0$, i.e. capital inflow is an increasing function of the spread between domestic and foreign interest rates. Note, however, that k_α is not assumed infinite. In other words, we assume the supply curve is assumed not to be perfectly elastic. Rajan (1999b) 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, one needs to make a clear distinction between *capital account deregulation* and *financial sector deregulation*. (also see Claessens and Glaessner, 1998). 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 account¹⁵.

Substituting eqs. (8) and (9) into eq. (7) obtains:

$$L^d(r_t, i_t, Y_t) = (1-\tau)\lambda(\cdot)(R_t^d/\tau + k(\alpha_t) + K_{t-1}). \quad (10)$$

Totally differentiating eq. (10) derives:

$$d[L^d_i - (1-\tau)\lambda_i F_t] = dr[-L^d_r - (1-\tau)\lambda_r F_t + (1-\tau)\lambda(\cdot)k_\alpha] - dY[L^d_Y] - [dr^* + d\varepsilon + drp](k_\alpha)(1-\tau)\lambda(\cdot) - d\tau(R/\tau^2)\lambda(\cdot) \quad (10)^1$$

From eq. (10)¹, we can solve for the bond market rate in terms of current period variables:

¹⁵ 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).

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

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

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 eq. (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:

$$T(Y_t) - r^*K_{t-1} + \Delta K^*_t = \Delta R^*_t = BP \quad (14)$$

Eq. (14) states that the current account balance plus capital inflow must equal the change in reserves¹⁶. This BOP equilibrium is, therefore, the usual BP curve. Substituting eq. (3) into eq. (14) derives:

¹⁶ In the case of the SEA economies, on average, total capital inflows (as a percent 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, were among the ten largest emerging

$$T(Y_t) = r^*K^*_t - (1 + r^* - \tau)k(\alpha_t) \quad (15)$$

Totally differentiating eq. (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.

Goods and Credit Market

Substituting eq. (11) into eq. (13), derives:

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

Following Bernanke and Blinder, eq. (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 eq. (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.

Money Market

Using eq. (3), the money market equilibrium simply requires that the money supply must equal money demand:

market recipients of net private capital flows during the period under consideration (Lopez-Mejia, 1999 and World Bank, 1997).

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

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 the following eq.:

$$D^h(r_t, i_t, Y_t) = R_t^d / \tau. \quad (18)^I$$

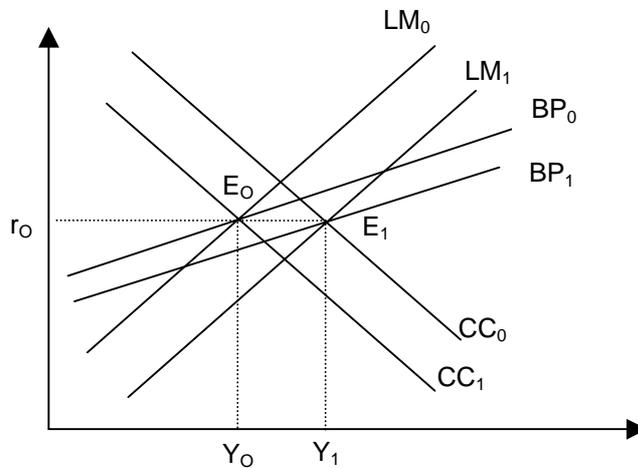
Differentiating eq. (18)^I w.r.t. r_t derives:

$$(\partial r_t / \partial Y_t)_{LM} = -[D_Y^h + D_{iY}^h] / [D_r^h + D_{ir}^h] \quad (20)$$

In order to ensure that the LM curve is unambiguously positive, we require that $|D_{iY}^h| > D_r^h$.

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 deposit) rate, which is our focus, given the bank-dominated financial intermediation process in SEA. Second, is the maintained assumption that $(\partial r_t^b / \partial Y_t)_{LM} > (\partial r_t^b / \partial Y_t)_{BP}$ i.e. $[D_Y^h + D_{iY}^h] / [D_r^h + D_{ir}^h] < T_Y / (1 + r^* - \tau) k_\alpha$.

Figure 1 Fall in Risk Premium

3. 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, increased bullishness about growth prospects of the emerging economy). The induced capital inflows shifts 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 deficit¹⁷. 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.

¹⁷ 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 rp_t .

We can explore the effects more formally by considering some simple comparative statics of the system of equations characterizing this economy. Substitute eq. (15) into eq. (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 eqs. (18) and (21).

Differentiating the two eqs. w.r.t. r_t derives:

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

As usual, the determinant of the first matrix on the left hand side (l.h.s.) (Λ) < 0 . It is easy to see to confirm that:

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

Note that as long as $\partial r_t / \partial r_{p_t} < 1$, even as $r_{p_t} \rightarrow 0$, domestic interest rates need not fall to international levels (r^*). Referring to Table 4, one sees 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. However, a substantial positive premium persisted in all the economies (save Malaysia, this being consistent with the low share of bank lending to the country vis-à-vis the other SEA economies, Thailand in particular).

4. Capital Reversals and Currency Crises

Having provided a probable boom scenario, the question that follows is what caused the bust. We divide the discussion into initial triggers leading to slowdown in capital inflows/outright reversals, on the one hand, and eventual currency crisis, on the other.

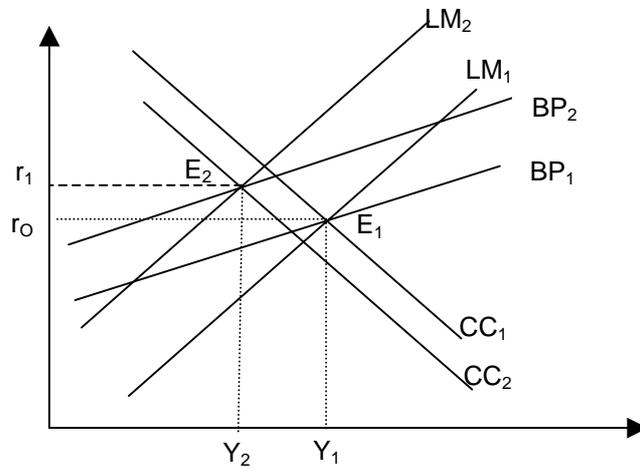
4.1 Triggers

It has become common in the literature on international capital flows to distinguish between external and internal shocks (see Eichengreen and Mody, 1998 and references cited within). External shocks involve an exogenous change in foreign interest rates or risk premia, while internal ones include demand and cost variations. Consistent with this, the suggested triggers in the case of the SEA economies have been numerous, with no obvious consensus. For instance, Eichengreen (1999) has emphasized the anticipated rise in Japanese short term interest rates in the spring of 1997 as being the trigger to a fall in capital flows; while McKibbin (1998) stresses the role of the US interest rate hike in late March 1997 and subsequent drop in the US stock market. Yet others such as the Bank of Thailand (BOT) (1998) and Rajan (1999a) have stressed the abrupt export growth slowdown in SEA (Thailand in particular) as being among the proximate triggers of the crisis. Finally, Radelet and Sachs (1998a,b), Chang and Velasco (1998) and others have emphasized a bank panic and resulting illiquidity as the trigger. The remainder of this section briefly examines the effects of a hike in foreign interest rates, exogenous fall in export demand and the effects of a bank panic and liquidity crunch.

Rise in Foreign Interest Rates

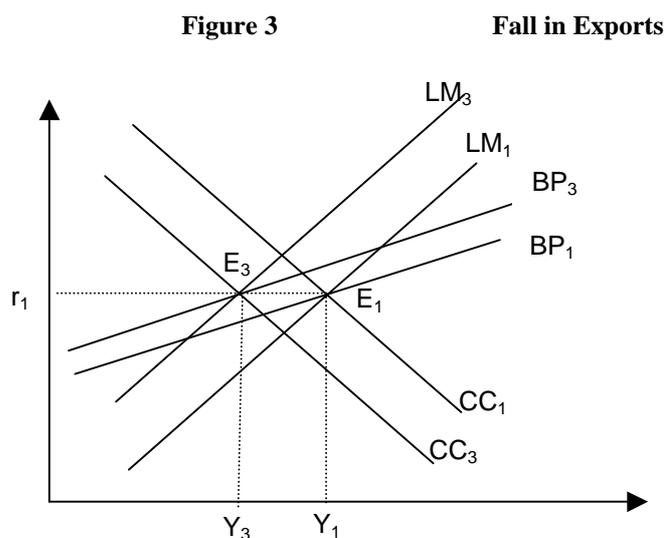
Calvo et al. (1994, 1996) have emphasized the importance of changes in foreign interest rates as being key in affecting the extent of capital inflows to emerging economies. The effects are similar to the case of a decline in risk premium noted in section 3. To be sure, it is clear that as international interest rates rise, the extent of capital inflows is diminished. This will cause the BP curve to shift to the left (BP_1 to BP_2) (Figure 2). The capital outflows imply a fall in reserves, which will lead to a leftward shift of both the LM (LM_1 to LM_2) and CC (CC_1 to CC_2) curves and a new equilibrium (E_2) corresponding to lower output and higher domestic interest rates.

Figure 2 **Rise in Foreign Interest Rates**



Fall in Exports

Assume an exogenous decline in exports. This implies a leftward shift of the CC curve (from CC_1 to CC_3) (Figure 3). At E_3^I , however, there will be a BOP deficit, with the capital outflows leading to leftward shifts of the BP (BP_1 to BP_3) and LM (LM_1 to LM_3) curves and a further leftward shift of the CC curve (to CC_4) until equilibrium is attained at E_3 . It is clear that while Y_t has unambiguously declined, the effect on r_t is ambiguous. However, if the export slump is sustained or debt is accumulated on a short term basis, such that creditors may become skittish about repayment prospects and be unwilling to roll over existing debts, let alone extend new ones. This in turn ought to lead to an upward jump in the risk premium, further reducing output and raising interest rates.



Bank Fragilities

Assume that there is some sort of domestic “bank panic”, such that households decide to exogenously shift liquid assets from (interest-bearing) demand deposits to currency (cash). This in turn will lead to leftward movements in the LM and CC curves given the fall in money supply, resulting in a decline in Y_t and a rise in r_t . Following Hermalin and Rose (1999), assume the existence of some sort of asymmetric information, such that foreign lenders are not aware of the domestic financial sector problems. Consequently, the country/currency risk premium and expectations of stability remain unchanged, and we have the paradoxical result that increased domestic financial fragility (in the form of a domestic bank run in this case) could provide an inducement in the short and medium terms for higher capital inflow¹⁸. This is consistent with the experiences of a number of emerging economies in SEA and elsewhere, in which there was an intensification of capital inflows despite evidence of domestic financial weaknesses (World Bank, 1997, 1998). In the long run, though, it is likely that the risk premium will rise, hence lowering long run credit flows (see section 3.2).

¹⁸ Of course, to the extent that some part of domestic credit consists of foreign capital inflows, some fraction of the initial reduction in domestic credit could be due to a decline in this component. Thus, the net effect of a domestic bank run on foreign capital inflows must take into account this initial decline.

Credit Crunch

If there is an exogenous fall in bank lending, due to, for instance, a rise in the levels of non-performing loans (NPLs) and the need for greater loan loss provision and the like, this will lead to a leftward shifts of the CC and LM curves. The effects will be similar to the case of a bank panic as discussed above. Of course, in reality, when domestic firms are highly leveraged, there will be a feedback effect, with the initial decline in exports/output leading to some firms unable to repay bank loans, which in turn increase the NPLs of banks and a credit crunch, with the there being a vicious cycle of corporate illiquidity leading to insolvencies, worsening bank NPLs and further credit tightening.

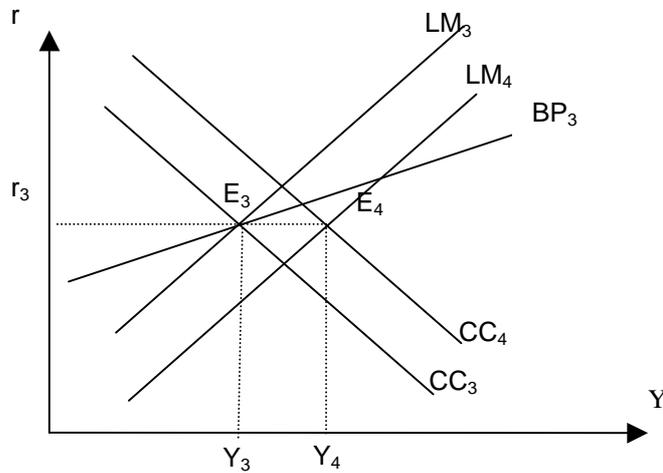
3.2 Crisis Scenario

Whatever the reason for the negative shock, in all cases, there will eventually be an upward jump in the risk premium and positive expected exchange rate depreciation and a consequent decline in output and rise in domestic interest rates¹⁹. However, given the importance of bank intermediation in developing economies, on the one hand, and the potentially calamitous effects of capital slowdown/reversal from the domestic financial system (i.e., the Fisherian debt deflation channel), on the other, it is unlikely that this high interest rate policy is sustainable²⁰. A more likely scenario is that the authorities allow the domestic money supply to increase to replace foreign capital inflows. This effectively shifts the LM and CC curves right to compensate for the decline in capital inflows or capital outflows. They may also bail out those institutions that do fail. Such an expansionary strategy, by preventing the rise in domestic interest rates that would otherwise occur, perpetuates the capital outflows. To be sure, assume that the LM and CC curves both shift right (from LM₃ to LM₄

¹⁹ See for instance, McKibbin (1998b) and McKibbin and Martin (1998) who assume a sharp jump in the regional risk premia following reevaluation of risks and concomitant capital outflows.

and CC_3 to CC_4 , respectively) (Figure 4). Consequently, the CC-LM equilibrium now occurs *below* the BP schedule (E_4).

Figure 4 Monetary Expansion and Crisis Scenario



All this is a reasonable approximation to what happened in Thailand during the period of increasing financial weakness from 1996 to mid-1997, in which there was a *de facto* nationalization of the troubled enterprises, as the Bank of Thailand (BOT) provided massive liquidity to ailing commercial banks and finance houses (World Bank, 1999). Moreover the sterilization of falling international revenues designed to ensure the smooth growth of the money supply during a period of crisis also helps explain why the monetary base in Thailand rose in spite of the fall in reserves (Rajan, 1999b).

The authorities are, therefore, faced with a dilemma, viz. either to abandon the exchange rate peg or to run down international reserves. There is a real possibility that the devaluation may create a panic and the very crisis that the authorities are seeking to avoid (Calvo and Mendoza, 1996 and Sachs et al., 1996a). In addition, if a large portion of domestic liabilities have been accumulated in foreign currencies which were unhedged (given credible peg prior to the crisis)²¹, a devaluation could actually prove to be contractionary in the short

²⁰ The costs of hiking interest rates is a non-negligible point, because, technically speaking, governments could defend a currency peg (by reducing the monetary base sufficiently) as long as they were willing to subordinate all other goals to it (Obstfeld and Rogoff, 1995).

²¹ Calvo and Reinhart (1999) refer to this as "liability dollarization".

and medium terms, turning a currency crisis into a banking crisis, and possibly an outright currency and banking collapse (Corbett and Vines, 1999)²².

This point is easy enough to develop within our (bank-centred Mundell-Fleming) framework. Specifically, let the trade balance, $T = T(Y_t, \text{rer}_t)$, where rer_t refers to real exchange rate (price of tradables to nontradables) and $T_{\text{rer}} > 0$. Also let domestic absorption, $A_t = A(i_t, r_t, \text{rer}_t)$, where $A_{\text{rer}} < 0$. Thus, a real exchange rate depreciation (i.e. $\text{rer}_t > 0$) will boost the exportables sector, on the one hand (competitiveness channel), while contracting domestic demand by lowering the net value of leveraged, bank constrained firms, on the other (Fisherian balance sheet effects). Thus, the net impact of a real devaluation on aggregate demand depends on the relative magnitudes of the two effects. To the extent that the competitiveness channel tends to take some time to materialize (given the “J curve” effects and other rigidities), while the balance sheet (valuation) effects are immediate, it is likely that a devaluation could have potentially large contractionary effects in the short run (Krugman, 1999).

Thus, while both policies (viz. high interest rates and maintenance of the peg or revoking it) will lead to domestic recessions, they are distinct in their adjustment processes. In the former, the recession is faced by all economic activities that depend on bank leverage. In the latter, firms producing goods with high import contents and those exposed to unhedged foreign debt will be hardest hit. On the other hand, export-oriented firms will benefit (notwithstanding the above-noted short run adjustments effects)²³. In both cases, banks will be hit hard, either with liquidity risks (due to balance sheet maturity mismatches) or credit risks (due to default by borrowers). In any case, this policy dilemma in the face of domestic economic weaknesses, could give rise to a second generation-type - escape clause-based -

²² Calvo and Reinhart (1999) also emphasize the contractionary effects of a devaluation. This is not a new issue, having been formally explored early on in a comprehensive, but relatively neglected paper by van Wijnbergen (1986). There are also, in addition, a number of political consequences of devaluing, though, as Willett (1998, p.812-3) appropriately notes, little empirical work has been done on the magnitude of the political costs of devaluation.

²³ To the extent that it is the small firms that are most dependent on financing through banks and tend to service the domestic market rather than export ones, they will be the ones most affected in either case.

currency crisis, and seems to be a probable explanation for the spread of the contagion effects of the crisis from Thailand to the regional economies.

If, on the other hand, the policy stance is maintained, international reserves will continue to be drained, requiring ever-increasing monetary infusions to prevent an interest rate hike. Once reserves fall to some minimal level, the country becomes vulnerable to a first generation-type currency crisis due to monetary disequilibrium a la Krugman (1979). This story seems to fit the Thai crisis well²⁴. Indeed, Corbett and Vines (1999, pp.167-8) summarized the above succinctly as follows:

there does not appear to be a need to appeal to self-fulfilling ideas in order to explain Thailand's original devaluation...(However) ...in none of the other economies was overheating or macroeconomic vulnerability nearly as obvious as in the Thai economy....For these economies, there does appear to be a need to appeal to self-fulfilling-currency crisis ideas in order to explain their initial devaluations.

5. Concluding Observations

The capital outflow and accompanying bust in SEA in 1997 and 1998 was preceded by a prolonged boom, fuelled primarily by large scale capital inflows all through the early 1990s, a significant proportion of which was intermediated through the domestic banking sectors. Motivated by this observation, along with the recognition of the importance of the credit (bank lending) transmission channel in the crisis-hit SEA economies and the co-occurrence of banking and currency crises in SEA and elsewhere (Kaminsky and Reinhart, 1996), this paper has explored the boom and bust cycle of capital inflows and reversals to the regional economies.

The framework used was an 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

²⁴ Thus, Williamson (1999, p.3) has noted of the July 1997 devaluation of the Thai baht:

(t)he Bank of Thailand resisted practically to its last dollar, whereupon it bowed to the inevitable and let the baht float down. All that is terribly familiar, pretty much like any other old-fashioned exchange rate crisis...

in SEA precrisis, i.e. the sustained (non-constant) interest rate differential offered despite evidence of fairly credible *ex-ante* fixed exchange rates (Thailand in particular). The framework was flexible enough to accommodate the alternative explanations for the initial trigger to the crisis in SEA, viz., export decline, foreign interest rate hike and bank panic and liquidity crunch, leading eventually to the collapse of the Thai baht in July 1997 and the regional contagion thereafter.

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