

**Managing Risks in a Volatile Environment:
The Capital Inflows Problem in Asia¹**

by

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¹ Parts of this paper draw on and develop upon background work done by the second author for chapter 4 in Kharas and Gill (eds.) (2006).

Managing Risks in a Volatile Environment: The Capital Inflows Problem in Asia

Abstract:

Since the financial crisis of 1997-98 and the subsequent sharp capital outflows from economies in Emerging Asia, the region has been running persistent balance of payments surpluses. The region has consequently become a *net* exporter of capital to the rest of the world while still depending very heavily on *gross* financing from the rest of the world. This paper has two parts. It briefly considers the dynamics of international capital flows to Emerging Asia, focusing on the types of flows into and out of the region. One way of overcoming the liquidity effects of persistent capital inflow is for policymakers to employ sterilized intervention. The paper therefore goes on to estimate the extent of monetary sterilization in Emerging Asia over the sample period 1990m1 to 2007m12.

Keywords: Balance of payments surplus, Capital flows, Emerging Asia, International Reserves, Sterilization.

1. Introduction

Prior to the crisis the region viewed openness to trade and financial flows as instruments almost solely to maximize growth. In the immediate aftermath of the regional crisis of 1997-98 there were widespread concerns that the Emerging Asian economies would withdraw from international capital markets. However, while this fear proved to be largely unfounded,² the regional economies have endeavored consciously post-crisis to use international capital markets to insure themselves against abrupt reversals in capital flows as well. In particular, since the financial crisis of 1997-98 and the subsequent sharp capital outflows from Emerging Asian economies, the region as a whole has been running persistent balance of payments surpluses and has consequently been rapidly stockpiling international reserves. The region has consequently become a *net* exporter of capital to the rest of the world while still depending very heavily on *gross* financing from the rest of the world.

This paper is organized around three sections. Section 2 briefly considers the dynamics of international capital flows to Emerging Asia, focusing on the types of flows into and out of the region. Section 3 estimates the extent of monetary sterilization in Emerging Asia over the sample period 1990m1 to 2007m12. Section 4 concludes with a few policy suggestions on choice of exchange rate regime. The basic theme of the paper is that while reserve accumulation acts as a risk mitigation device, it is leading to domestic and global macroeconomic imbalances developing in other areas. And while monetary sterilization is a device designed to reduce the inflationary risks of reserve

² We say “largely” because while the regional economies have generally remained open to international capital flows, there are two notable exceptions. One, Malaysia imposed capital controls in September 1998 but has since removed them. Two, some East Asian economies have tightened regulations with regard to the offshore trading of currencies.

accumulation, it propagating the capital inflows problem in Asia.

2. Balance of Payments Dynamics and Reserve Accumulation since the Crisis

It is commonly noted that there has been a marked rise in Emerging Asia's aggregate current account surplus since the abrupt and massive capital flow reversals after the crisis of 1997-98 (Figure 1 and Aizenman and Siregar, 2006). Current account surpluses and limited exchange flexibility have resulted in the rapid and massive accumulation of reserves in the region (Figure 2) and, as such, the region as a whole accounts for about one half of global reserve accumulation in the world.³ While China and Japan have been the drivers of this trend, India, Korea, the other NIEs and ASEAN have also experienced significant swelling of their reserves. For Korea and other economies that were hit by the crisis, policy makers appear to have chosen explicitly to amass reserves for precautionary or self-insurance motives against the risk of future financial crisis (Aizenman and Marion, 2003 and Bird and Rajan, 2003).⁴

Even if current account surpluses in the region come down, less recognized is the fact that the region's reserve accumulation is also driven by dynamics in private capital flows (also see IMF, 2005). Since 2000, while the current account surplus still dominates, the private capital account surplus in Emerging Asia has accounted for a growing share of the region's reserve accretion. In view of this it is essential to understand the patterns and

³ See Aizenman and Siregar (2006) for more detailed descriptive data of reserve stockpiling in East Asia.

⁴ There has been a growing body of literature exploring various aspects of the precautionary motive for reserve hoarding. See Aizenman et al. (2007), García and Soto (2004), Jeanne and Ranciere (2006), Kim et al. (2004) and Li and Rajan (2006).

dynamics of private capital flows to Emerging Asia.⁵

Is capital *pulled* into recipient countries by their internal policies and performance, or is it *pushed* towards them as a consequence of external factors beyond their control, such as interest rates and economic activity in the rest of the world? Recent research suggests that pull and push factors may be complementary, with push factors determining the timing and magnitude of capital flows to emerging economies and pull factors determining their geographic distribution (Carlson and Hernandez, 2002, Dasgupta and Ratha, 2000 and Montiel and Reinhart, 2000).

The search for returns led to a surge in foreign capital inflows into Emerging Asia before the crisis. During the boom period in Emerging Asia in the early-to-mid 1990s there were large capital inflows into the region from the rest of the world. Structural or trend factors leading to a surge in global capital flows to emerging markets included rapid improvements in telecommunications and information technologies, the proliferation of financial instruments, the institutionalization of savings, and the internationalization of investment portfolios (mutual and pension funds) in search of opportunities for risk diversification (World Bank, 1997). The attractive growth prospects along with credibly (at the time) fixed exchange rates, sound domestic macroeconomic policies (actual or perceived) and progressive financial and capital account deregulation in many of the Emerging Asian economies, were forces pulling capital flows specifically into the region in general.

However, the subsequent loss of confidence in these economies resulted in a massive turnaround in capital flows in 1997, i.e. boom was followed by bust. What do the

⁵ A significant part of the balance of payments surplus is, of course, driven by China. See Ouyang et al. (2007) and Prasad and Wei (2006) for details on the dynamics of the capital and current account balances in China.

data tell us about this? Table 1 summarizes balance of payments data from the IMF for Emerging Asia.⁶ The data reveal that Emerging Asia experienced a sharp reversal in net private capital flows of over \$90 billion between 1997 and 1998. This reversal was primarily due to the “other” net private capital flows which include net short term lending by foreign commercial banks. This component averaged about \$7 billion in *inflows* between 1990 and 1996 but turned into a net *outflow* of about \$80 billion on average in the following four years as international banks became unwilling to roll over existing short-term debts to the region. This sudden reversal in bank lending is often presented as providing strong evidence in support of a bank panic model. However, a less emphasized feature of this period was the decline in portfolio flows following the initial bank panic as investors also tried to scale down their exposures in the region (also see Carlson and Hernandez, 2002 and Rajan and Siregar, 2002). In contrast, FDI flows remained remarkably stable throughout the period under consideration.⁷

The region remained relatively unattractive to private capital between 1997 and

⁶ The World Bank capital flows data is on net medium and long-term resource transfers and therefore does not include very short-term capital flows. The World Bank data also exclude capital flows to Asian NIEs along with Japan. Accordingly, Table 1 summarizes balance of payments data from the IMF for all emerging economies and emerging Asia (which is dominated by the Emerging East Asian region but also includes some systemically important non East Asian countries like India).

⁷ Two caveats should be noted. One, Indonesia was the only exception, FDI having collapsed due to ongoing socio-political uncertainties (World Bank, 1999 and Rajan and Siregar, 2002). Two, the implicit assumption is that there is little or no relationship between the various types of capital flows. Rajan (2005) discusses the nexus between FDI and other forms of capital flows and stresses the need to be circumspect in concluding unambiguously that FDI is a stable source of financing. In view of the complex linkages between the various capital flows, Chuhan et al. (1996) and Claessens et al. (1995) argue that it may be misleading to look at capital flows individually, with the latter maintaining that it is only meaningful to examine aggregate financial accounts. Also see Sarno and Taylor (1997).

2002 but has since consolidated and is again attracting foreign capital inflows.⁸ After a period of consolidation and recovery (including the IT-induced global downturn in 2001),⁹ there has been a resurgence in net capital inflows to the region since 2003. Inflows of all types of capital inflows to China were particularly high, no doubt in part due to the expectations of a renminbi revaluation (Prasad, 2005), though capital flows to Korea and much of Southeast Asia also picked up, supported by rising credit ratings of emerging market issuers over the past few years. While improving fundamentals have also pulled inflows into the Emerging Asian region, large-scale global liquidity, low industrial country interest rates and lower risk aversion have been factors pushing capital from industrial countries to emerging economies in general (BIS, 2004, Upper and Wooldridge, 2006 and World Bank, 2003, 2004, 2005a).

After the outflows and deleveraging recorded between 1998 and 2001, debt to emerging economies stabilized in 2001-2002 and rose markedly in 2002-2003 as many regional economies, including Korea, China and some ASEAN economies have successfully issued bonds internationally; international creditors are once again actively participating in international syndicated loans in the region.¹⁰ While not readily apparent from the data, it is generally reported that the average maturity of bank loans has lengthened (World Bank, 2003, 2004). This, along with the reserve stockpiling, has resulted in the regional economies experiencing declines in short term debt to reserves

⁸ See Aizenman and Siregar (2006) for more detailed descriptive data on capital flows into the region.

⁹ The IMF (2004, chapter 4) discusses the post-crisis external debt adjustment in East Asia and other crisis-hit emerging economies.

¹⁰ See “Capital Flows to Emerging Market Economies,” International Institute of Finance (IIF), various issues. See www.iif.com.

and short-term debt to external debt ratios.¹¹ Another important characteristic of debt inflows to Asia is the growing share of marketable debt instruments (i.e., bonds). This is a result of a deliberate decision by these economies to develop and upgrade their bond markets as a means of diversifying their financial systems and instruments (we return to this important point in the next section).

3. Impact of Resurgence of Capital Inflows to Emerging Asia

Persistent balance of payments surpluses when coupled with a managed exchange rate regime, impose an upward pressure on a country's money base. This is because the associated inflows place pressure on the currency to appreciate, and to negate this, central banks need to purchase foreign reserves, thus increasing the monetary base. Central banks that engage in sterilization attempt to neutralize this monetary effect by purchasing domestic currency assets in the open market.

More formally, the extent of sterilization (λ) can be ascertained from the following equation:

$$(\Delta NDA_t / RM_{t-1}) = \theta + \lambda(\Delta NFA_t / RM_{t-1}) + \varepsilon_t \quad (1)$$

where ΔNDA_t (ΔNFA_t) refers to net domestic (foreign) assets held by the central bank, and RM_{t-1} is lagged reserve money. For full sterilization, λ would be expected to be equal to -1. Partial sterilization is represented by the coefficient returning a value between greater

¹¹ See Kim et al. (2004) for an analytical discussion of the crisis-inducing nature of short-term debt (as well as portfolio equity flows) and references cited within.

than -1 but less than zero.

Table 2 shows the extent of sterilization by presenting the *contemporaneous* sterilization – the degree to which (the first difference of) domestic assets move in response to (the first difference of) foreign assets. The results of three samples are reported. The first is the full sample, 1990m1 to 2007m12. The second is the pre-crisis sample 1990m1 to 1997m5 and the third sample is the post-crisis sample 1999m1 to 2007m12. Monthly observations are used. Data on net foreign assets and reserve money are taken from lines (11-16c) and line 14, respectively of the IMF International Financial Statistics. Net domestic assets are calculated by subtracting net foreign assets from reserve money.

From Table 2 several observations stand out. First, for the most part, the sterilization coefficient is highly statistically significant. From the full sample it can be seen that that Korea and Malaysia appear to be sterilizing the full reserve effect on any capital inflow. In fact, Korea and Malaysia seem to be over sterilizing. This suggests a possible concern over the inflationary consequences of capital inflows and a desire to avoid any monetary expansion whatsoever. Indonesia, the Philippines, Singapore and Thailand are indicative of high but partial sterilization. Interestingly, sterilization in China and India appear to be relatively low, though this is likely because both countries (China especially) have extensively made use of alterations in reserve requirements to keep the overall broader money supply (M2) from growing rapidly (see Ouyang et al., 2007, 2008)

A comparison of the post-crisis results with the pre-crisis results shows that Korea and Malaysia still maintain very high levels of sterilization – although Korea does not

appear to oversterilize as it did before the crisis. Thailand (slightly) and the Philippines (quite substantially) exhibit evidence of less sterilization in the more recent time periods while Indonesia and Singapore would appear to sterilize more than it did pre-crisis, as does India.

Figure 3 presents the results for some recursive least squares estimates of λ . For the most part, these appear to confirm the results of the OLS estimates. The results show that Malaysia and Singapore increased the extent of sterilization after the crisis, as did India post 2000. The Philippines and Thailand exhibited slightly decreased levels of sterilization though the levels remain high. Korea and Indonesia maintained relative stable and high sterilization. In broad terms, the levels of sterilization present are similar in both sets of results.

An interesting conclusion regarding these results is that sterilization, while offering the central bank the option of attaining some degree of monetary independence, also removes the mechanism that may halt the inflow of capital. This is because sterilization keeps interest rate artificially high and, thus, potentially encourages further capital inflow through the *pull* channel (see Calvo, 1991 and Cavoli and Rajan 2006b). This perpetuates the vulnerability that gave rise to the decision to sterilize in the first instance.

4. Conclusion

Before the crisis, the IT bubble and financial markets development led to large capital inflows. During the crisis aftermath, the region experienced sharp and painful capital reversals, as short-term portfolio investment started to flow out and banks stopped rolling over debt. Net capital inflows have returned to the region quite strongly due to a

combination of both push factors (easy money globally and higher appetite for risk) and pull factors (structural reforms in Emerging Asia and policy liberalization measures to encourage capital inflows). However, there has been a change in their destination (with China being a particular magnet for FDI) and structure. Indications are that the region has become somewhat less vulnerable to sudden shifts in investor sentiment than they were a few years ago. This is reflected in the dominance of FDI, lengthening of maturities of liabilities, and rapid and massive stockpiling of a war chest of reserves. As IMF (2005) has opined:

Regional economies are now more resilient to a sudden reversal of inflows than a decade ago, because their economic fundamentals have improved, and because exchange rates in the majority of economies are more flexible. Furthermore, risks to the banking systems in the region have diminished because only a small portion of the flows, this time, have been intermediated through banks, leaving their balance-sheets largely unaffected. However, not all economies have moved at the same pace in reducing domestic and external vulnerabilities. Some economies still possess underlying weaknesses, which leave them vulnerable to a sudden reversal of capital flows that can be brought by changes in sentiment and international financial conditions.¹²

As the search for high returns has been reinforced by the search for stability in the post-crisis environment, the savings surplus Emerging Asian region has been involved in an international exchange of risks with international capital markets. But there are two related concerns. First, as the Emerging Asian economies continue to grow rapidly and become even more significant players in the global economy, it is important that the

¹² In addition, while there has been a better matching in the current composition of assets and liabilities in the Emerging East Asia region, this is largely due to an accumulation of reserves in foreign currency terms. It is important to ensure that individual corporates and financial institutions take appropriate care to manage the risks associated with these currency mismatch risks.

region pays greater attention to the implications of their actions on the global economy.¹³ Second, the rapid accumulation of reserves is proving to be increasingly costly, especially as some regional central banks are becoming less able to effectively sterilize their monetary effects. Excessive and rapid liquidity buildup could have adverse inflationary consequences. The monetary overhang could also be channeled inefficiently into certain nontradable sectors such as real estate.¹⁴

Allowing exchange rates to react relatively more to market forces should go some way in alleviating the strains on liquidity growth arising from reserve build-up. If exchange rate flexibility is introduced in a judicious manner -- China being particularly key in this regard -- it may also promote more balanced growth domestically and also facilitate the rebalancing of the global economy.¹⁵

¹³ Conversely, Emerging Asian economies need to be given a larger voice in international macroeconomic and monetary affairs.

¹⁴ Xie (2006) highlights concerns of excessive liquidity growth in China. As he notes: China's macro today resembles that of Southeast Asia ten years ago: (1) Booming exports and expectations of currency appreciation are sustaining massive surplus liquidity in the banking system; (2) Banks lend mainly against collateral, especially land, which channels a rising share of the excess liquidity into land, causing land inflation. The land inflation increases the value of the collateral, which causes more liquidity to flow into land; (3) Low interest rates cause speculative demand for property with a large foreign component; and (4) Property inflation causes ordinary households to advance purchase decisions for fear of higher future prices.

¹⁵ Of course, this rebalancing will not occur absent commitment by the US to address its gaping fiscal deficit.

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Table 1: Net Capital Flows to Emerging Asia, 1990-2006
(US\$ billions)

	Average 1990-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
Private capital flows, net	49.0	121.1	47.6	-53.8	3.1	6.5	19.6	20.8	63.5	120.3	53.8	55.2
Direct investment, net	28.9	53.5	57.1	56.8	71.6	59.0	51.6	50.7	67.9	60.0	71.8	76.5
Private portfolio flows, net	13.8	32.0	6.8	8.8	56.9	20.2	51.2	-59.9	4.4	3.8	-31.1	-24.5
Other private capital flows, net	6.3	35.6	-16.4	-119.4	-125.4	72.8	19.1	30.0	-8.8	56.4	13.1	3.3
Official flows, net	4.9	-16.1	14.0	19.6	1.8	11.7	11.7	4.6	-17.6	1.8	5.0	-0.2
Change in reserves	-34.6	-46.8	-35.8	-53.1	-88.2	53.7	90.2	-148.8	-226.5	-340.1	-281.9	-302.2

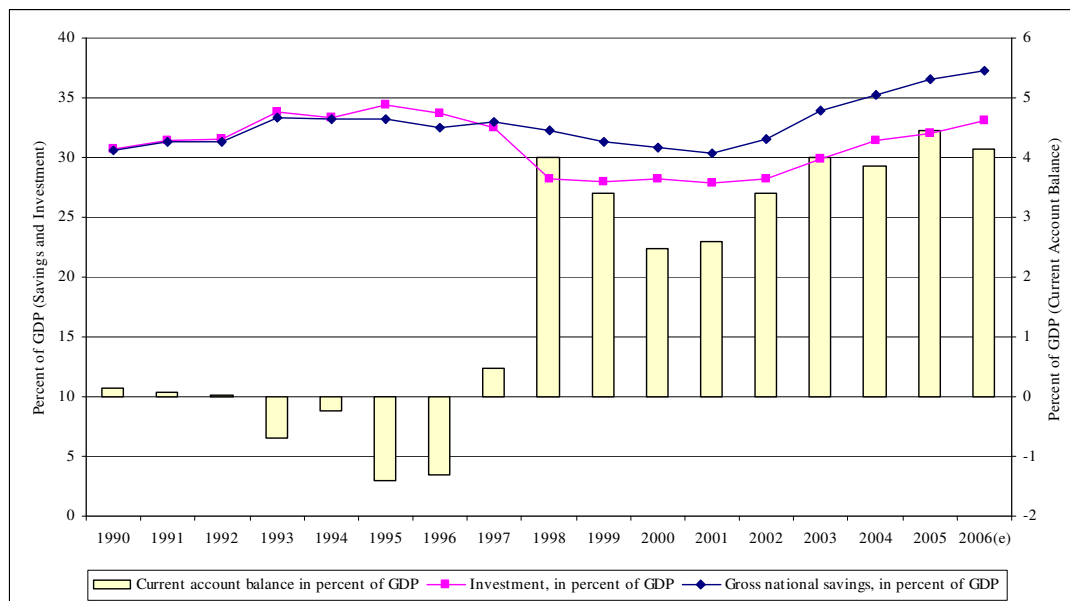
Source: IMF, WEO April 2006 database (<http://www.imf.org/external/pubs/ft/weo/2006/01/data/index.htm>).

Table 2: Sterilization Coefficients for Selected Asian Countries 1999-2006

Country	Full sample	Pre-crisis	Post-crisis
China	- (0.00)	- (0.00)	-0.49 (0.05)
India	-0.70 (0.00)	-0.49 (0.02)	-0.73 (0.00)
Indonesia	-0.94 (0.00)	-0.94 (0.00)	-0.97 (0.00)
Korea	-1.03 (0.00)	-1.03 (0.00)	-0.98 (0.00)
Malaysia	-1.01 (0.00)	-0.88 (0.00)	-1.00 (0.00)
Philippines	-0.88 (0.00)	-1.02 (0.00)	-0.87 (0.00)
Singapore	-0.91 (0.00)	-0.83 (0.00)	-0.95 (0.00)
Thailand	-0.89 (0.00)	-0.80 (0.00)	-0.77 (0.00)

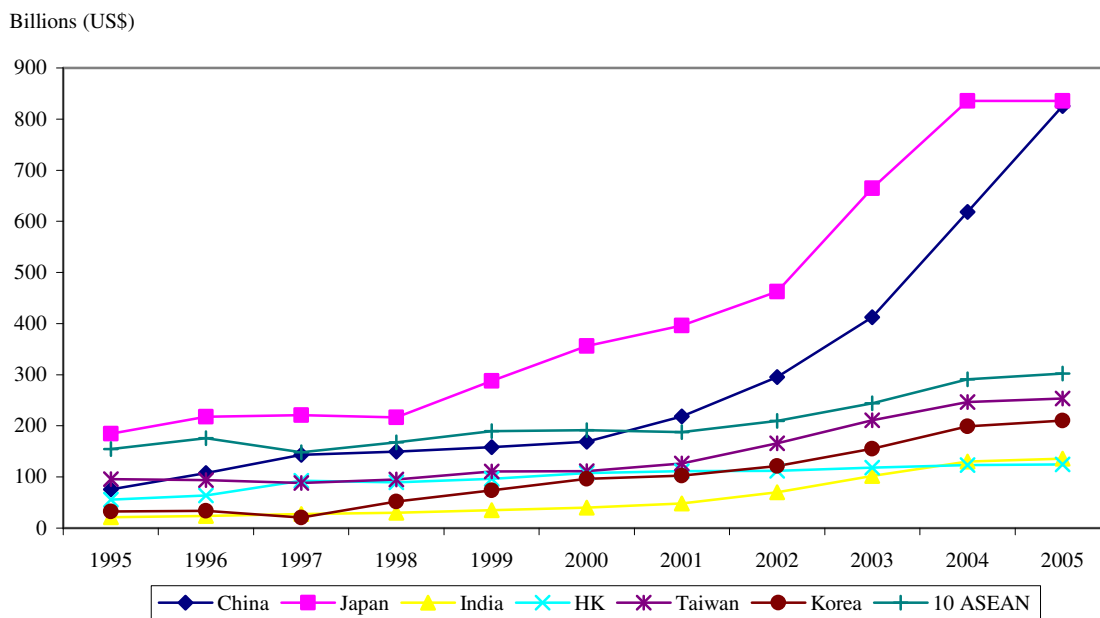
Notes: Figures in brackets are P-values. All coefficients presented are contemporaneous sterilization coefficients. Each equation was initially modelled as an Autoregressive Distributed Lag (ARDL) model with lag length selection being based on Schwartz Bayesian Criteria (SBC) and on ensuring that coefficient estimates not being biased due to serial correlation. The full sample of data was a set of monthly observations from 1990.1 to 2007.12 except China where the sample began at 1999.6. The pre-crisis sample is 1990.1 to 1997.5. The post-crisis sample is 1999.1 to 2007.12. The full set of estimates is available from the authors.

Figure 1
Emerging Asia and NIEs: Savings, Investment and Current Account, 1990-2006
 (Percent of GDP)



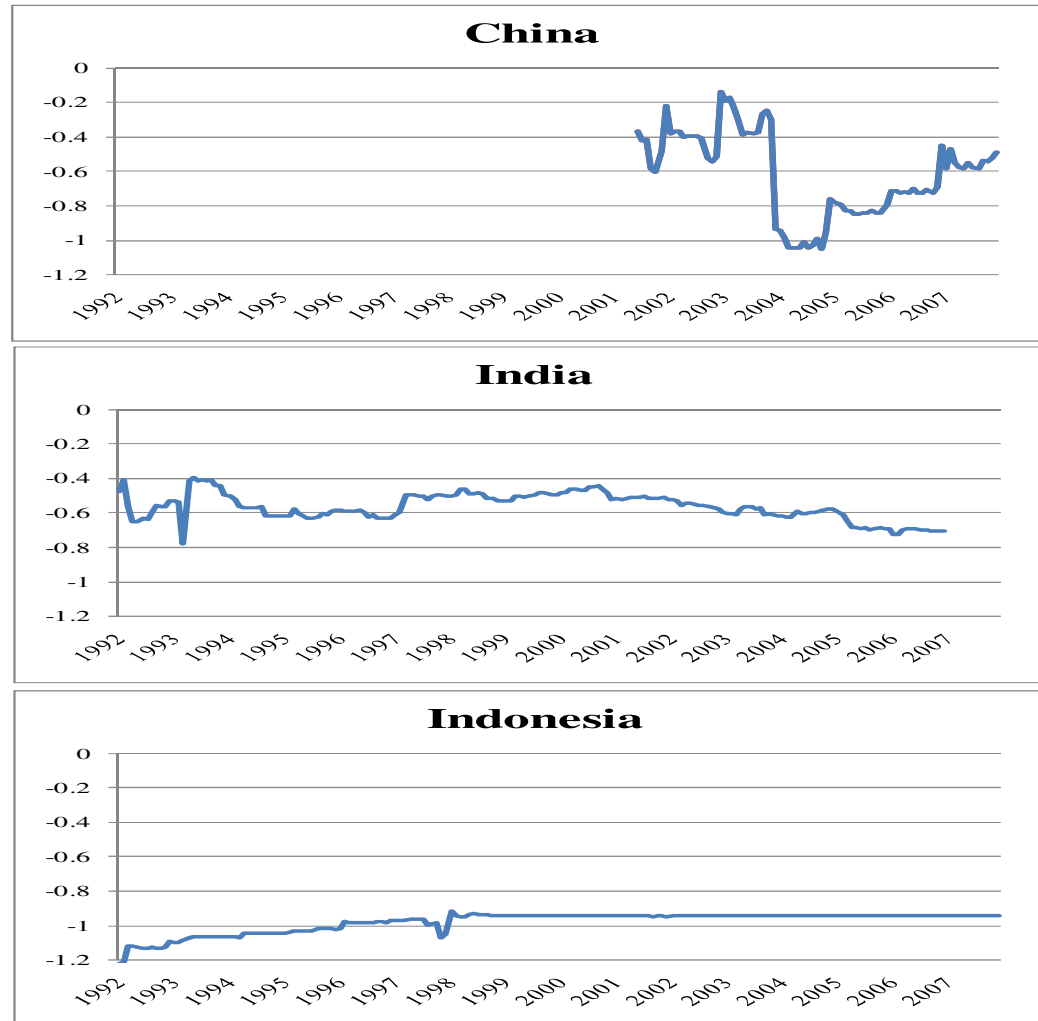
Source: IMF, WEO April 2006 database
<http://www.imf.org/external/pubs/ft/weo/2006/01/data/index.htm>.
 Emerging Asia includes: ASEAN-9 (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam), NIEs (Hong Kong, Korea, Singapore, Taiwan), China and others (South Asia including India and Pacific island economies).

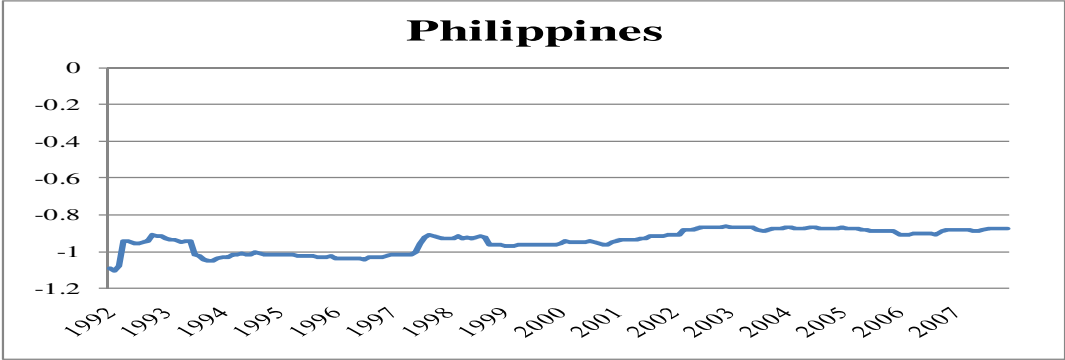
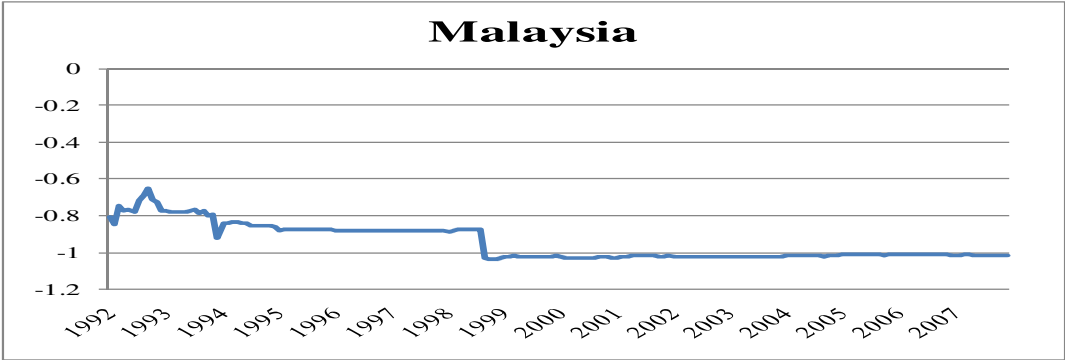
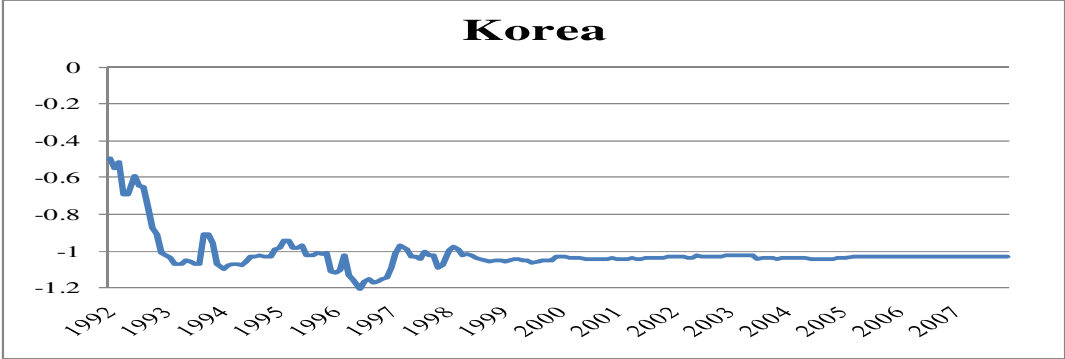
Figure 2
Total Reserve Holdings in Asia (including Gold), 1995-2004
 (US\$ Billions)

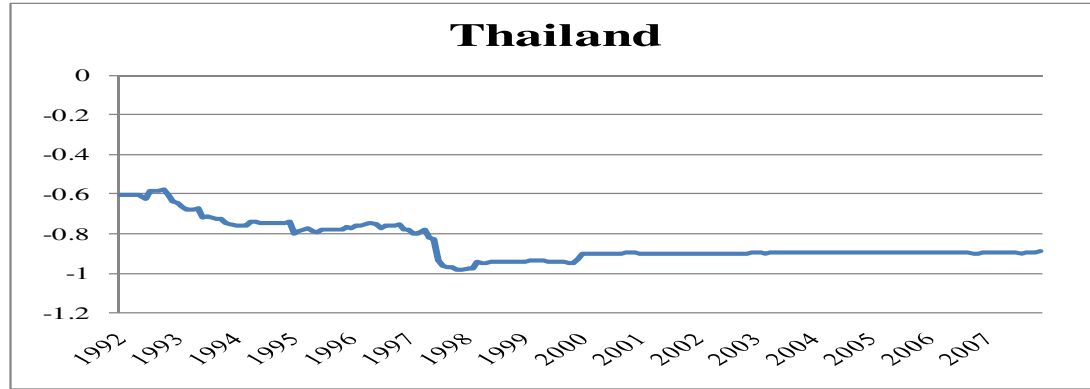
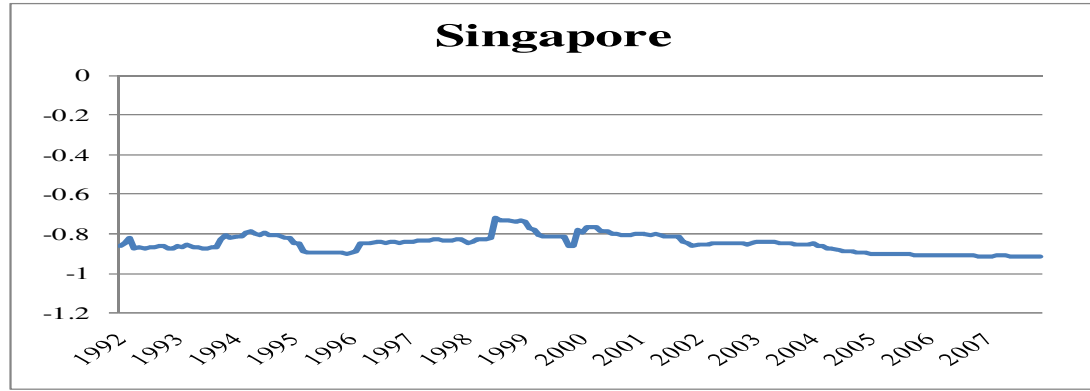


Source: All data are from IFS, except Taiwan. The data from 1995-2004 for Taiwan is from AREMOS dataset which is published by Taiwan Economic Data Center. The 2005 data for Taiwan is updated from Taiwan's central bank website.

Figure 3
Recursive Least Squares Coefficients







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Keywords: Balance of payments surplus, Capital flows, Emerging Asia, International Reserves, Sterilization.

1. Introduction

Prior to the crisis the region viewed openness to trade and financial flows as instruments almost solely to maximize growth. In the immediate aftermath of the regional crisis of 1997-98 there were widespread concerns that the Emerging Asian economies would withdraw from international capital markets. However, while this fear proved to be largely unfounded,² the regional economies have endeavored consciously post-crisis to use international capital markets to insure themselves against abrupt reversals in capital flows as well. In particular, since the financial crisis of 1997-98 and the subsequent sharp capital outflows from Emerging Asian economies, the region as a whole has been running persistent balance of payments surpluses and has consequently been rapidly stockpiling international reserves. The region has consequently become a *net* exporter of capital to the rest of the world while still depending very heavily on *gross* financing from the rest of the world.

This paper is organized around three sections. Section 2 briefly considers the dynamics of international capital flows to Emerging Asia, focusing on the types of flows into and out of the region. Section 3 estimates the extent of monetary sterilization in Emerging Asia over the sample period 1990m1 to 2007m12. Section 4 concludes with a few policy suggestions on choice of exchange rate regime. The basic theme of the paper is that while reserve accumulation acts as a risk mitigation device, it is leading to domestic and global macroeconomic imbalances developing in other areas. And while monetary sterilization is a device designed to reduce the inflationary risks of reserve

² We say “largely” because while the regional economies have generally remained open to international capital flows, there are two notable exceptions. One, Malaysia imposed capital controls in September 1998 but has since removed them. Two, some East Asian economies have tightened regulations with regard to the offshore trading of currencies.

accumulation, it propagating the capital inflows problem in Asia.

2. Balance of Payments Dynamics and Reserve Accumulation since the Crisis

It is commonly noted that there has been a marked rise in Emerging Asia's aggregate current account surplus since the abrupt and massive capital flow reversals after the crisis of 1997-98 (Figure 1 and Aizenman and Siregar, 2006). Current account surpluses and limited exchange flexibility have resulted in the rapid and massive accumulation of reserves in the region (Figure 2) and, as such, the region as a whole accounts for about one half of global reserve accumulation in the world.³ While China and Japan have been the drivers of this trend, India, Korea, the other NIEs and ASEAN have also experienced significant swelling of their reserves. For Korea and other economies that were hit by the crisis, policy makers appear to have chosen explicitly to amass reserves for precautionary or self-insurance motives against the risk of future financial crisis (Aizenman and Marion, 2003 and Bird and Rajan, 2003).⁴

Even if current account surpluses in the region come down, less recognized is the fact that the region's reserve accumulation is also driven by dynamics in private capital flows (also see IMF, 2005). Since 2000, while the current account surplus still dominates, the private capital account surplus in Emerging Asia has accounted for a growing share of the region's reserve accretion. In view of this it is essential to understand the patterns and

³ See Aizenman and Siregar (2006) for more detailed descriptive data of reserve stockpiling in East Asia.

⁴ There has been a growing body of literature exploring various aspects of the precautionary motive for reserve hoarding. See Aizenman et al. (2007), García and Soto (2004), Jeanne and Ranciere (2006), Kim et al. (2004) and Li and Rajan (2006).

dynamics of private capital flows to Emerging Asia.⁵

Is capital *pulled* into recipient countries by their internal policies and performance, or is it *pushed* towards them as a consequence of external factors beyond their control, such as interest rates and economic activity in the rest of the world? Recent research suggests that pull and push factors may be complementary, with push factors determining the timing and magnitude of capital flows to emerging economies and pull factors determining their geographic distribution (Carlson and Hernandez, 2002, Dasgupta and Ratha, 2000 and Montiel and Reinhart, 2000).

The search for returns led to a surge in foreign capital inflows into Emerging Asia before the crisis. During the boom period in Emerging Asia in the early-to-mid 1990s there were large capital inflows into the region from the rest of the world. Structural or trend factors leading to a surge in global capital flows to emerging markets included rapid improvements in telecommunications and information technologies, the proliferation of financial instruments, the institutionalization of savings, and the internationalization of investment portfolios (mutual and pension funds) in search of opportunities for risk diversification (World Bank, 1997). The attractive growth prospects along with credibly (at the time) fixed exchange rates, sound domestic macroeconomic policies (actual or perceived) and progressive financial and capital account deregulation in many of the Emerging Asian economies, were forces pulling capital flows specifically into the region in general.

However, the subsequent loss of confidence in these economies resulted in a massive turnaround in capital flows in 1997, i.e. boom was followed by bust. What do the

⁵ A significant part of the balance of payments surplus is, of course, driven by China. See Ouyang et al. (2007) and Prasad and Wei (2006) for details on the dynamics of the capital and current account balances in China.

data tell us about this? Table 1 summarizes balance of payments data from the IMF for Emerging Asia.⁶ The data reveal that Emerging Asia experienced a sharp reversal in net private capital flows of over \$90 billion between 1997 and 1998. This reversal was primarily due to the “other” net private capital flows which include net short term lending by foreign commercial banks. This component averaged about \$7 billion in *inflows* between 1990 and 1996 but turned into a net *outflow* of about \$80 billion on average in the following four years as international banks became unwilling to roll over existing short-term debts to the region. This sudden reversal in bank lending is often presented as providing strong evidence in support of a bank panic model. However, a less emphasized feature of this period was the decline in portfolio flows following the initial bank panic as investors also tried to scale down their exposures in the region (also see Carlson and Hernandez, 2002 and Rajan and Siregar, 2002). In contrast, FDI flows remained remarkably stable throughout the period under consideration.⁷

The region remained relatively unattractive to private capital between 1997 and

⁶ The World Bank capital flows data is on net medium and long-term resource transfers and therefore does not include very short-term capital flows. The World Bank data also exclude capital flows to Asian NIEs along with Japan. Accordingly, Table 1 summarizes balance of payments data from the IMF for all emerging economies and emerging Asia (which is dominated by the Emerging East Asian region but also includes some systemically important non East Asian countries like India).

⁷ Two caveats should be noted. One, Indonesia was the only exception, FDI having collapsed due to ongoing socio-political uncertainties (World Bank, 1999 and Rajan and Siregar, 2002). Two, the implicit assumption is that there is little or no relationship between the various types of capital flows. Rajan (2005) discusses the nexus between FDI and other forms of capital flows and stresses the need to be circumspect in concluding unambiguously that FDI is a stable source of financing. In view of the complex linkages between the various capital flows, Chuhan et al. (1996) and Claessens et al. (1995) argue that it may be misleading to look at capital flows individually, with the latter maintaining that it is only meaningful to examine aggregate financial accounts. Also see Sarno and Taylor (1997).

2002 but has since consolidated and is again attracting foreign capital inflows.⁸ After a period of consolidation and recovery (including the IT-induced global downturn in 2001),⁹ there has been a resurgence in net capital inflows to the region since 2003. Inflows of all types of capital inflows to China were particularly high, no doubt in part due to the expectations of a renminbi revaluation (Prasad, 2005), though capital flows to Korea and much of Southeast Asia also picked up, supported by rising credit ratings of emerging market issuers over the past few years. While improving fundamentals have also pulled inflows into the Emerging Asian region, large-scale global liquidity, low industrial country interest rates and lower risk aversion have been factors pushing capital from industrial countries to emerging economies in general (BIS, 2004, Upper and Wooldridge, 2006 and World Bank, 2003, 2004, 2005a).

After the outflows and deleveraging recorded between 1998 and 2001, debt to emerging economies stabilized in 2001-2002 and rose markedly in 2002-2003 as many regional economies, including Korea, China and some ASEAN economies have successfully issued bonds internationally; international creditors are once again actively participating in international syndicated loans in the region.¹⁰ While not readily apparent from the data, it is generally reported that the average maturity of bank loans has lengthened (World Bank, 2003, 2004). This, along with the reserve stockpiling, has resulted in the regional economies experiencing declines in short term debt to reserves

⁸ See Aizenman and Siregar (2006) for more detailed descriptive data on capital flows into the region.

⁹ The IMF (2004, chapter 4) discusses the post-crisis external debt adjustment in East Asia and other crisis-hit emerging economies.

¹⁰ See “Capital Flows to Emerging Market Economies,” International Institute of Finance (IIF), various issues. See www.iif.com.

and short-term debt to external debt ratios.¹¹ Another important characteristic of debt inflows to Asia is the growing share of marketable debt instruments (i.e., bonds). This is a result of a deliberate decision by these economies to develop and upgrade their bond markets as a means of diversifying their financial systems and instruments (we return to this important point in the next section).

3. Impact of Resurgence of Capital Inflows to Emerging Asia

Persistent balance of payments surpluses when coupled with a managed exchange rate regime, impose an upward pressure on a country's money base. This is because the associated inflows place pressure on the currency to appreciate, and to negate this, central banks need to purchase foreign reserves, thus increasing the monetary base. Central banks that engage in sterilization attempt to neutralize this monetary effect by purchasing domestic currency assets in the open market.

More formally, the extent of sterilization (λ) can be ascertained from the following equation:

$$(\Delta NDA_t / RM_{t-1}) = \theta + \lambda(\Delta NFA_t / RM_{t-1}) + \varepsilon_t \quad (1)$$

where ΔNDA_t (ΔNFA_t) refers to net domestic (foreign) assets held by the central bank, and RM_{t-1} is lagged reserve money. For full sterilization, λ would be expected to be equal to -1. Partial sterilization is represented by the coefficient returning a value between greater

¹¹ See Kim et al. (2004) for an analytical discussion of the crisis-inducing nature of short-term debt (as well as portfolio equity flows) and references cited within.

than -1 but less than zero.

Table 2 shows the extent of sterilization by presenting the *contemporaneous* sterilization – the degree to which (the first difference of) domestic assets move in response to (the first difference of) foreign assets. The results of three samples are reported. The first is the full sample, 1990m1 to 2007m12. The second is the pre-crisis sample 1990m1 to 1997m5 and the third sample is the post-crisis sample 1999m1 to 2007m12. Monthly observations are used. Data on net foreign assets and reserve money are taken from lines (11-16c) and line 14, respectively of the IMF International Financial Statistics. Net domestic assets are calculated by subtracting net foreign assets from reserve money.

From Table 2 several observations stand out. First, for the most part, the sterilization coefficient is highly statistically significant. From the full sample it can be seen that that Korea and Malaysia appear to be sterilizing the full reserve effect on any capital inflow. In fact, Korea and Malaysia seem to be over sterilizing. This suggests a possible concern over the inflationary consequences of capital inflows and a desire to avoid any monetary expansion whatsoever. Indonesia, the Philippines, Singapore and Thailand are indicative of high but partial sterilization. Interestingly, sterilization in China and India appear to be relatively low, though this is likely because both countries (China especially) have extensively made use of alterations in reserve requirements to keep the overall broader money supply (M2) from growing rapidly (see Ouyang et al., 2007, 2008)

A comparison of the post-crisis results with the pre-crisis results shows that Korea and Malaysia still maintain very high levels of sterilization – although Korea does not

appear to oversterilize as it did before the crisis. Thailand (slightly) and the Philippines (quite substantially) exhibit evidence of less sterilization in the more recent time periods while Indonesia and Singapore would appear to sterilize more than it did pre-crisis, as does India.

Figure 3 presents the results for some recursive least squares estimates of λ . For the most part, these appear to confirm the results of the OLS estimates. The results show that Malaysia and Singapore increased the extent of sterilization after the crisis, as did India post 2000. The Philippines and Thailand exhibited slightly decreased levels of sterilization though the levels remain high. Korea and Indonesia maintained relative stable and high sterilization. In broad terms, the levels of sterilization present are similar in both sets of results.

An interesting conclusion regarding these results is that sterilization, while offering the central bank the option of attaining some degree of monetary independence, also removes the mechanism that may halt the inflow of capital. This is because sterilization keeps interest rate artificially high and, thus, potentially encourages further capital inflow through the *pull* channel (see Calvo, 1991 and Cavoli and Rajan 2006b). This perpetuates the vulnerability that gave rise to the decision to sterilize in the first instance.

4. Conclusion

Before the crisis, the IT bubble and financial markets development led to large capital inflows. During the crisis aftermath, the region experienced sharp and painful capital reversals, as short-term portfolio investment started to flow out and banks stopped rolling over debt. Net capital inflows have returned to the region quite strongly due to a

combination of both push factors (easy money globally and higher appetite for risk) and pull factors (structural reforms in Emerging Asia and policy liberalization measures to encourage capital inflows). However, there has been a change in their destination (with China being a particular magnet for FDI) and structure. Indications are that the region has become somewhat less vulnerable to sudden shifts in investor sentiment than they were a few years ago. This is reflected in the dominance of FDI, lengthening of maturities of liabilities, and rapid and massive stockpiling of a war chest of reserves. As IMF (2005) has opined:

Regional economies are now more resilient to a sudden reversal of inflows than a decade ago, because their economic fundamentals have improved, and because exchange rates in the majority of economies are more flexible. Furthermore, risks to the banking systems in the region have diminished because only a small portion of the flows, this time, have been intermediated through banks, leaving their balance-sheets largely unaffected. However, not all economies have moved at the same pace in reducing domestic and external vulnerabilities. Some economies still possess underlying weaknesses, which leave them vulnerable to a sudden reversal of capital flows that can be brought by changes in sentiment and international financial conditions.¹²

As the search for high returns has been reinforced by the search for stability in the post-crisis environment, the savings surplus Emerging Asian region has been involved in an international exchange of risks with international capital markets. But there are two related concerns. First, as the Emerging Asian economies continue to grow rapidly and become even more significant players in the global economy, it is important that the

¹² In addition, while there has been a better matching in the current composition of assets and liabilities in the Emerging East Asia region, this is largely due to an accumulation of reserves in foreign currency terms. It is important to ensure that individual corporates and financial institutions take appropriate care to manage the risks associated with these currency mismatch risks.

region pays greater attention to the implications of their actions on the global economy.¹³ Second, the rapid accumulation of reserves is proving to be increasingly costly, especially as some regional central banks are becoming less able to effectively sterilize their monetary effects. Excessive and rapid liquidity buildup could have adverse inflationary consequences. The monetary overhang could also be channeled inefficiently into certain nontradable sectors such as real estate.¹⁴

Allowing exchange rates to react relatively more to market forces should go some way in alleviating the strains on liquidity growth arising from reserve build-up. If exchange rate flexibility is introduced in a judicious manner -- China being particularly key in this regard -- it may also promote more balanced growth domestically and also facilitate the rebalancing of the global economy.¹⁵

¹³ Conversely, Emerging Asian economies need to be given a larger voice in international macroeconomic and monetary affairs.

¹⁴ Xie (2006) highlights concerns of excessive liquidity growth in China. As he notes: China's macro today resembles that of Southeast Asia ten years ago: (1) Booming exports and expectations of currency appreciation are sustaining massive surplus liquidity in the banking system; (2) Banks lend mainly against collateral, especially land, which channels a rising share of the excess liquidity into land, causing land inflation. The land inflation increases the value of the collateral, which causes more liquidity to flow into land; (3) Low interest rates cause speculative demand for property with a large foreign component; and (4) Property inflation causes ordinary households to advance purchase decisions for fear of higher future prices.

¹⁵ Of course, this rebalancing will not occur absent commitment by the US to address its gaping fiscal deficit.

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Table 1: Net Capital Flows to Emerging Asia, 1990-2006
(US\$ billions)

	Average 1990-1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
Private capital flows, net	49.0	121.1	47.6	-53.8	3.1	6.5	19.6	20.8	63.5	120.3	53.8	55.2
Direct investment, net	28.9	53.5	57.1	56.8	71.6	59.0	51.6	50.7	67.9	60.0	71.8	76.5
Private portfolio flows, net	13.8	32.0	6.8	8.8	56.9	20.2	51.2	-59.9	4.4	3.8	-31.1	-24.5
Other private capital flows, net	6.3	35.6	-16.4	-119.4	-125.4	72.8	19.1	30.0	-8.8	56.4	13.1	3.3
Official flows, net	4.9	-16.1	14.0	19.6	1.8	11.7	11.7	4.6	-17.6	1.8	5.0	-0.2
Change in reserves	-34.6	-46.8	-35.8	-53.1	-88.2	53.7	90.2	-148.8	-226.5	-340.1	-281.9	-302.2

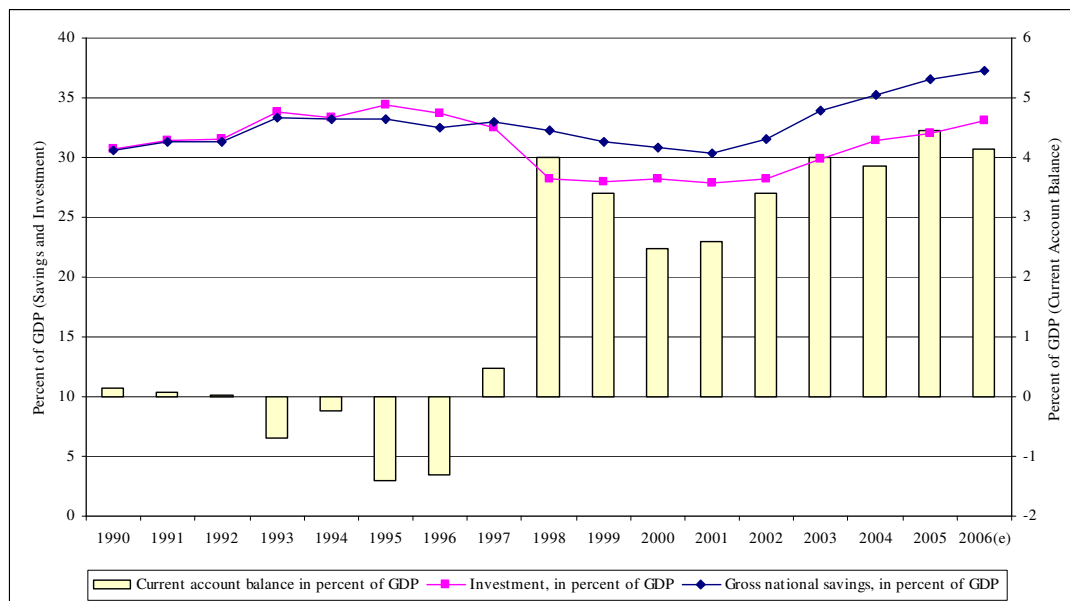
Source: IMF, WEO April 2006 database (<http://www.imf.org/external/pubs/ft/weo/2006/01/data/index.htm>).

Table 2: Sterilization Coefficients for Selected Asian Countries 1999-2006

Country	Full sample	Pre-crisis	Post-crisis
China	- (0.00)	- (0.00)	-0.49 (0.05)
India	-0.70 (0.00)	-0.49 (0.02)	-0.73 (0.00)
Indonesia	-0.94 (0.00)	-0.94 (0.00)	-0.97 (0.00)
Korea	-1.03 (0.00)	-1.03 (0.00)	-0.98 (0.00)
Malaysia	-1.01 (0.00)	-0.88 (0.00)	-1.00 (0.00)
Philippines	-0.88 (0.00)	-1.02 (0.00)	-0.87 (0.00)
Singapore	-0.91 (0.00)	-0.83 (0.00)	-0.95 (0.00)
Thailand	-0.89 (0.00)	-0.80 (0.00)	-0.77 (0.00)

Notes: Figures in brackets are P-values. All coefficients presented are contemporaneous sterilization coefficients. Each equation was initially modelled as an Autoregressive Distributed Lag (ARDL) model with lag length selection being based on Schwartz Bayesian Criteria (SBC) and on ensuring that coefficient estimates not being biased due to serial correlation. The full sample of data was a set of monthly observations from 1990.1 to 2007.12 except China where the sample began at 1999.6. The pre-crisis sample is 1990.1 to 1997.5. The post-crisis sample is 1999.1 to 2007.12. The full set of estimates is available from the authors.

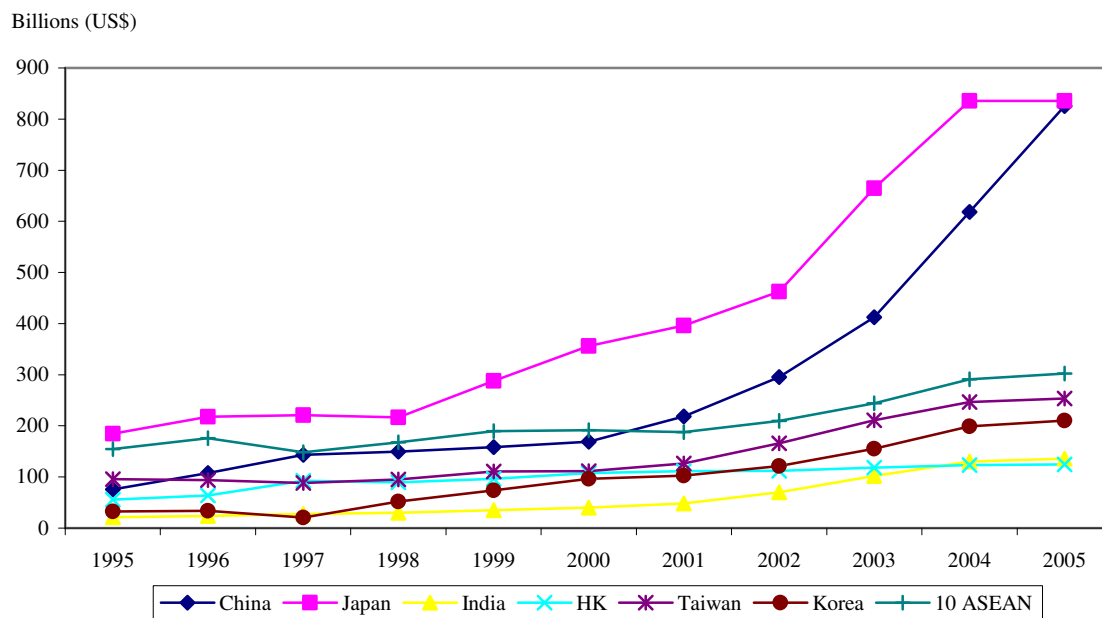
Figure 1
Emerging Asia and NIEs: Savings, Investment and Current Account, 1990-2006
 (Percent of GDP)



Source: IMF, WEO April 2006 database
<http://www.imf.org/external/pubs/ft/weo/2006/01/data/index.htm>.

Emerging Asia includes: ASEAN-9 (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand and Vietnam), NIEs (Hong Kong, Korea, Singapore, Taiwan), China and others (South Asia including India and Pacific island economies).

Figure 2
Total Reserve Holdings in Asia (including Gold), 1995-2004
 (US\$ Billions)



Source: All data are from IFS, except Taiwan. The data from 1995-2004 for Taiwan is from AREMOS dataset which is published by Taiwan Economic Data Center. The 2005 data for Taiwan is updated from Taiwan's central bank website.

Figure 3
Recursive Least Squares Coefficients

