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Central Banks and Capital Flows

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February 2008

ADB Institute Discussion Paper No. 87

Stephen Grenville is a visiting fellow at the Lowy Institute for International Policy Sydney and an adjunct professor at the Crawford School, Australian National University, Canberra. This paper was written while the author was a consultant to the Asian Development Bank Institute. He thanks all those who participated in the two seminars at ADBI on this topic for their valuable insights.

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Abstract

Sudden capital outflows were at the heart of the 1997-98 Asian crisis. Ten years later, capital flows are back on the policy agenda, but in a very different context. The countries of East Asia are now getting more inflows than they can effectively absorb and the upward pressure on exchange rates is unwelcome.

These capital inflows reflect an ongoing structural disequilibrium: foreign capital will be attracted by the higher returns and the prospect of currency appreciation. In this environment, the exchange rate will be poorly anchored by fundamentals, which threatens the stability of the financial system.

There is a range of possible policy responses. "Sand in the wheels," hedging, fiscal surpluses, current account surpluses, intervention using foreign exchange reserves, domestic taxes (both on foreign income and on capital gains), taxes on inflows (unremunerated reserve requirements), better bankruptcy arrangements, and stronger prudential measures may make some contribution, but each will be limited by institutional constraints and administrative capabilities.

JEL Classification: F21, F31, F32, F36, G15, G28

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A. How Have International Capital Flows Changed the Policy Environment?

We start with the presumption that international capital flows, like international trade flows, are a Good Thing. They give the opportunity for a capital-constrained emerging country to tap into the world supply of savings, not only increasing the quantity of funds available to it, but also reducing the cost (just as globalized trade opens up opportunities to buy more cheaply). The Feldstein/Horioka (1980) paradox suggests that there is room for much more international trade in capital to allow investment to take place in those countries with high marginal productivity of capital, whether or not they are also high savers. Just as there is an international division of labor reflecting comparative advantage, there is an international division of rentiers. Indeed, over time, the Paradox seems to be lessening, reflecting the larger international capital flows.

This would lead us to expect that on average over time, international capital will flow from the mature countries to the emerging countries and that these flows will become larger over time as the path of transmission becomes smoother, information become more available and institutional channels develop more depth. How long can these inflows be expected to persist? The short, if overly simple, answer is “as long as there is a difference in the marginal return to capital.”

We can remind ourselves of how these flows affect the macro-economy. If there is an autonomous increase in inflow (for example, as the country becomes more integrated with international financial markets), this can only be absorbed in terms of real goods and services if the exchange rate appreciates and the current account moves in the direction of deficit by the same amount as the capital flow.¹ This is the transfer problem that Keynes (1929) discussed. Two things are worth noting: that the exchange rate has to appreciate; and that the capital flow, accompanied by a current account deficit, adds as much to supply as it does to demand.

1. Macro-economics: Structural Interest Differentials

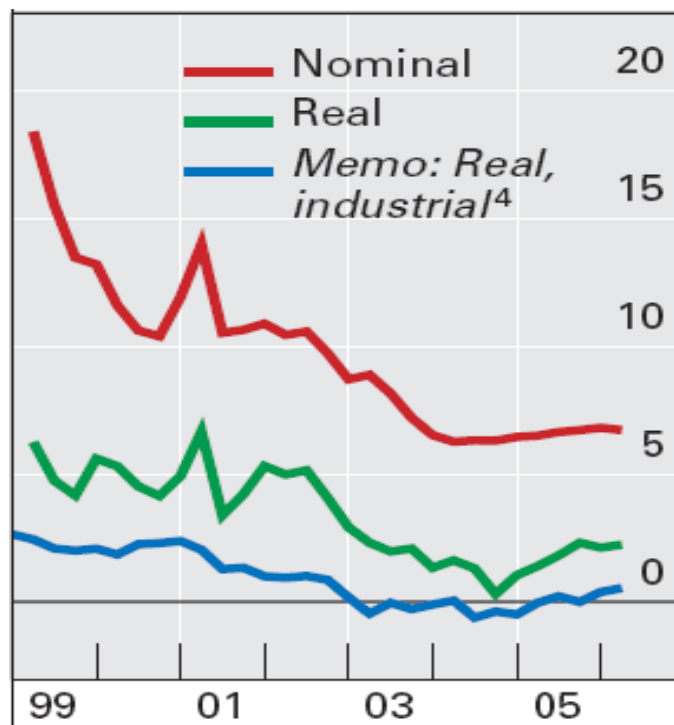
Emerging countries are likely to be high-growth, high productivity, high profit economies, as they move towards the best-practice production frontier.² Of course this is a jerky “punctuated evolution,” with diversions and setbacks caused by poor domestic policies, inefficiencies and shocks. There is, however, enough inherent dynamism and profitability in this transition to the frontier to ensure that the equilibrium interest rate in these emerging economies will, on average, be higher than in mature countries, because the return on physical capital is higher. One way of expressing this idea is to say that the Wicksellian “natural” interest rate for emerging countries is likely to be higher than for mature economies (Figure 1 suggests some empirical basis for this view). These emerging countries will attract foreign capital at those phases in the business cycle when investors feel confident about the risks (economic and political) of investing in countries about which they know little. This will happen, whatever the domestic policy interest setting. If the authorities try to keep interest rates low, the inflows will be used to buy real assets or equities. So the key point in thinking about interest rates is not that they have to be the *same* as international rates (as implied by the Impossible Trinity), but they *will be higher* over the medium term and policy has to work

¹ In terms of the Swan diagram, the external balance line moves to the right, and absorption increases by the same amount as the capital flow raises demand. A new equilibrium is found with an appreciated exchange rate and non-tradables more expensive compared with tradables.

² Lipschitz et al. (2002) illustrate this point by calculating physical capital per worker in Eastern Europe, which on average, is one-third of the German level. On the bold assumption of the same Cobb-Douglas production function, raising this to the German level would require net investment equal to nearly five times GDP. Even with a combination of domestic and substantial foreign-funded investment, it will take decades to bring the capital stock up to German levels.

around and adapt to this. This is a structural issue, not a cyclical one, so the exchange rate implications of the higher interest rate cannot be sorted out using the Dornbusch (1976) overshooting mechanism. Nor is the exchange rate *regime* a relevant issue: if the country maintains a fixed rate, the real exchange rate appreciation will come about through faster domestic inflation (e.g., Hong Kong, China, at least over its medium-term history).

Figure 1: Interest Rates, Emerging and Mature Economies



Source: BIS Annual Report 2006 Chapter IV.

Inflows will not only be encouraged by these structurally higher interest rates, but will be further encouraged by the prospect of structural exchange rate gains (as in Japan, where the rate appreciated from 360 yen/dollar to 100 in the early 1970s). This might be explained in terms of the Balassa/Samuelson theorem (differential productivity performance in the tradable vis-à-vis the non-traded sectors), or may simply reflect the high overall productivity as a rise in the capital/labor ratio as the country moves towards the best-practice production frontier. During this journey, interest rates need to be higher, and the real exchange rate may appreciate. This is an attractive intrinsic environment for capital inflows (for another description of this same process, see Lipschitz *et al.*, 2002).

2. Macroeconomics: How Does Monetary Policy Work in a Small Well-Integrated Economy?

So much for the medium-term structural forces: superimposed on these are the shorter-term cyclical influences which monetary policy addresses. How does monetary policy work in a globally integrated environment?

Three decades ago, in a less-integrated world, monetary policy worked by constraining the cyclical upswing and its accompanying asset price pressure, either with higher interest rates or credit controls, and impinged mostly on interest-sensitive expenditures such as investment and asset prices. Nowadays, for a small economy with a floating exchange rate and which is well integrated into international financial markets, when the monetary

authorities raise the short-term policy interest rate in response to inflation-threatening excess demand, some borrowers are able to move out along the yield curve and obtain their funds at rates which reflect the availability of foreign funding. Essentially, the higher domestic short-term interest rates encourage borrowers to tap into overseas sources of funds (usually indirectly through financial intermediaries) to obtain some of their financing at rates which do not fully reflect the rise in the domestic short-term policy rate.³ Tighter monetary policy induces extra capital inflow, *funding* the cyclical upswing, at the same time that it is being *constrained* through higher interest rates. This new exchange rate channel restrains the inflationary impact by providing additional supplies of appreciation-cheapened goods and services via the enlarged current account deficit. Monetary policy works through the exchange rate as well as the interest rate, and the former channel may be more powerful than the latter. Monetary policy is still effective, but it works differently. Excess demand is spilled overseas rather than restrained.⁴

B. Why Do Capital Flows Cause Problems?

1. Macro Problems

These can be grouped into three:

- Inflation pressures
- Exchange rate problems: appreciation of the exchange rate (uncomfortable for the traded sector) combined with a volatile/fragile exchange rate
- Loss of control over, or constraints on the free use of, monetary policy.

(a) Inflation

We argued above that capital flow adds as much to supply as it does to demand, so it should not, in itself, be inflationary. It might, however, be inflationary in other ways. If it makes monetary policy less effective or constrains the use of monetary policy, this might be relevant, but we will argue below that competent monetary policy can avoid this threat.

It does, however, leave open the possibility (in fact the likelihood) that the inflows will put pressure on *asset prices*. There are two possible inflationary channels. Although capital flow adds to supply, the inflow may be directed mainly at the purchase of existing assets (physical assets and equities might be thought of as non-traded goods), so the demand pressure is not offset much by the extra supply of cheap foreign goods and services. This asset price inflation is accommodated by the stance of domestic monetary policy, which targets CPI prices rather than asset prices. Central banks remain uncomfortable with this asset price inflation as it is distortionary while underway, exacerbates the cycle and is disruptive when the asset bubble eventually bursts. This was certainly the case in a number of East Asian countries in the years leading up to the Crisis. This does present a dilemma for policy: the authorities can raise interest rates, but they refrain from this (or do it only in moderation) partly out of the belief that their actions will be to some extent frustrated by extra capital inflows, but mainly because they do not believe they can effectively control asset prices and do not want to be blamed for pricking the bubble when the asset prices eventually

³ The borrowers may not feel constrained by the currency risk, as currencies of high interest rate countries tend to appreciate, reducing the costs of their borrowing.

⁴ There is a philosophical issue here. It was often the intention of policy, in the pre-integration regime, to restrain the excessive demand because of a presumption that it was excess, as well as excessive. It often consisted of investment booms and asset bubbles. Are we getting an optimal (or more optimal) outcome by allowing these “excessive” upswings to run their course?

fall. They have, moreover, judged themselves to be unable to do more than, at most, lean against the wind, ready to pick up the pieces when the asset bubble bursts. This is unsatisfactory, but represents the imperfect current “state of the art.”

If the inflow does bid up asset prices, there is a second possible effect. It increases the general investment demand via Tobin’s “q”: existing assets are now more expensive than the cost of reproducing them, so investment is boosted. Higher equity prices cheapen funding costs, so thus encourage more investment.

(b) What Is the Analytical Model for the Exchange Rate?

Cyclical pressures on the exchange rate (as it acts as an important channel for monetary policy) combine with the structural influences to produce an exchange rate which has a strong tendency towards appreciation, and has no clear anchor in the “fundamentals.”

It is possible to explain the cyclical path of the exchange rate in terms of the Dornbusch (1976) over-shooting model (although it is hard to identify this process in the real world), just as some cyclical movements may be explicable in terms of the world commodity-price cycle (see Gruen and Kortian, 1996). Economic analysis, however, has little to say about the path of the exchange rate during the decades-long journey to the technological frontier. It might be possible to envisage the exchange rate being on a steady trajectory towards the long-term equilibrium, when the economy has reached the technological frontier. But at any point on this path, this exchange rate will be too low for portfolio equilibrium, as the investors face the prospect of higher interest returns and exchange rate appreciation. Suppose the rate appreciates sufficiently to fully anticipate the end-point of the structural appreciation (some decades ahead): the investor still has the advantage of the higher interest rate in the meantime. So nothing short of a once-off appreciation beyond this long-term equilibrium, followed by a steady depreciation (rather like a very drawn out version of the Dornbusch over-shooting process) would maintain portfolio equilibrium.

We observe that this inflow is not equilibrated by price arbitrage: the foreign and domestic interest rates do not merge together over time. So there must be other forces at work constraining the inflow. One common approach is to explain the enduring interest differential as a “risk premium.” This might mechanically satisfy some portfolio balance constraint, but is analytically unhelpful unless some explanation can be offered for the risk premium and how it changes over time.

Is there a structural analogue of the cyclical Dornbusch overshooting mechanism? If the exchange rate appreciates and remains above its longer-term equilibrium until some random shock creates the risk of a short-term fall, the prospect of even a small fall in the near future outweighs the interest differential. This would have to be a very random, tenuous and unstructured equilibrium path because a longer-term investor would not be deterred by this short-term depreciation risk or high-frequency volatility. Investors with a short-term horizon, however, might want to cut their exposure. We might expect to see not only swings in the exchange rate of the recipient country, but in the capital-supplying country as well. This fits well with the experience of Japan during the yen-carry period: the substantial current account surplus, together with an undervalued exchange rate (a real rate which is lower than in the 1990s) punctuated by a sudden sharp appreciation whenever the outflows are in question (October 1998, August 2007) with very large swings (in the range of 80-150 yen/dollar).

This fits with the idea of “sudden stops.” Some simply call this a “time-varying risk premium” and leave it at that. The more honest approach is that taken by Krugman (2006), who calls this a Wyle E. Coyote process: “a moment when investors realize that the dollar’s value

doesn't make sense and that value plunges."⁵ This puts the sophistication of the analysis on the right level: that of a cartoon. The "search for yield" lasts as long as asset prices are rising and the boom is strong. The most plausible explanation of the Asian contagion in 1997 is Morris Goldstein's "wake up call": nothing more substantive than a reminder that there was an issue. More often than not, the trigger for outflow is an external policy event rather than a domestic one (see Feruci et al., 2004).⁶ Perhaps an insight can be gained by remembering that the foreign investors usually know very little about the specifics of their investment or even the country they have invested in. The arrival of a small amount of new information can add hugely to their stock of knowledge, and lead to an abrupt change of view.

The markets themselves encompass self-exacerbating processes. They use similar risk models, which signal the same decision-point for all investors. Credit rating agencies set their evaluations by looking in the rear vision mirror, and when they downgrade in response to bad news, investors (often driven by rating-specific mandates) are forced to sell. Herding ("if others are getting out, what do they know that I don't?") or "correlated errors" cause the investors to cut their investments at the same time, often into "crowded markets" where others are doing the same, with a large impact on prices. A fall in the exchange rate is supposed to create the expectation of a subsequent rise ("mean reversion"), but when the exchange rate is unanchored, it can fall greatly without encouraging new inflows (as seen during the Asian crisis). Eventually, however, the fall ends and the underlying interest differential reasserts itself, setting off a new exchange rate cycle.⁷

This creates the possibility—in fact the likelihood—of broad swings in the value of the currency, perhaps following the periodicity of the business cycle. This is not an issue of short-term volatility of the exchange rate (the usual subject of economic analysis and market risk-analysis), but of sustained departures from the equilibrium exchange rate: misalignment rather than volatility.

It is hardly surprising that policymakers find this world—an overly-appreciated exchange rate with a tendency to sudden gyrations—uncomfortable and unattractive. In most cases in East Asia since the crisis, with flexible exchange rates in place, the policy concern has not been that capital flows threaten price stability, but rather that the inflows set in train this appreciation/instability of the exchange rate.

⁵ Krugman (2006) provides the explanation: "For those not familiar with the classics: there were often scenes in Road Runner cartoons in which the ever-frustrated Wile E. Coyote would run off a cliff, take several steps on thin air, then look down – and only after realizing that there was nothing under him would he plunge" (p. 5). There are other inventive explanations, often brave attempts to maintain the rigor of the portfolio balance approach: McKinnon and Pill (1996) see the inflows reversing at the moment when foreign investors realize that the implicit guarantees to banks have been fully used up.

⁶ "The main finding is that push factors are important in explaining banking flows and bond spreads. In the case of the latter, the model suggests that two thirds of the compression in EME bond spreads in the period between October 2002 and earlier this year was explained by push factors alone, and in particular the fall in US short-term rates in 2001. This implies a need for caution by EMEs in borrowing too heavily during times of a benign external financing environment, as a reversal in credit conditions is more often than not beyond the control of the borrower." Feruci *et al.*, 2004, p. 89

⁷ The yen carry trade seems to illustrate these swings. Most of the time, the interest differential attracts flows to the country with the high interest rate, and pushes up its exchange rate. Every so often, those taking advantage of the uncovered carry become concerned about their exchange exposure, and when enough of them do, this risk is realized in the form of a sudden appreciation of the low-interest-rate country. This appreciation, however, restores the incentive for the carry-trade: the interest differential is attractive and there no longer seems to be an immediate prospect of future exchange loss. So the flow starts again and the recipient country's exchange rate appreciates once more.

The appreciated exchange rate undermines international competitiveness, at the cost of slower growth in the tradable sector, often the most dynamic sector of the economy (for argument in favor of under-valued rates and further references see Rodrik, 2007).⁸

The greater the appreciation, the larger the fall when the reassessment comes. With the addition of some overshooting in the opposite direction, spill-over into inflation and self-reinforcing capital flight (examined in the next section), the stage is set for a crisis.

With the exchange rate subject to this sort of random influence, policymakers face the difficult task of distinguishing between this randomness and the on-going and continuous changes in the equilibrium, with the danger that they may try to resist the latter as well as the former. However uncomfortable it may be, the authorities in the emerging countries have to accept the need for some appreciation. A capital inflow *should* put upward pressure on the exchange rate, because this is the mechanism through which the real counterpart of the financial capital inflow—the transfer of resources—takes place: the appreciation encourages imports and discourages exports.⁹ This is true whether the capital flow is long-term structural, or cyclical. In both cases the movement of the exchange rate is part and parcel of the adjustment process, and policy should not resist it. Its unwelcome nature is, however, understandable: even if the authorities acknowledge that this sequence—with appreciated exchange rate and current account deficit—is the necessary channel for the capital inflow to operate, they no doubt recall that both these same elements—appreciation and CAD—were identified as being central causes of the Asian crisis and often blamed for the problems (see, for example, Feldstein, 2000). Misguided though such criticism might have been, it was important in undermining confidence. Policymakers are understandably reluctant to leave themselves and their countries open to a repeat performance.

We might note in passing how the Impossible Trinity led to a focus on the wrong issue after the crisis. The exchange rate debate focused on the exchange rate *regime*: specifically on the need for “corner solutions” (the rate should either be immutably fixed or a pure free float). The middle ground of managed rates was out of bounds. Over time, opinion has softened and fuzzed (see Fischer, 2002) and now focuses, more narrowly and sensibly, on the dangers of a fixed-but-changeable peg. In the meantime, however, attention was distracted from the possibility—indeed the likelihood—that at times the unanchored exchange rate will be significantly away from its equilibrium value and for long enough to do damage. In the fixed/free-float dichotomy, policymakers have no need to think about some notion of the “right” level of the exchange rate. But if the middle ground of partially managed rates turns out to be the practical reality, then policymakers need a framework in which the value of the exchange rate has some place in their policy consideration.

Of course it is not easy to operationalize such a framework, and many will see this as a distraction from the single-objective approach to monetary policy. However, for countries that are not yet ready to let their shallow and immature foreign exchange market handle the price discovery (i.e., they retain a “fear of floating”: see Calvo and Reinhart, 2002), there is a vital need to have some fairly specific working notion of what is the “right” exchange rate (if only in terms of a range), and how this might change the cycle structurally over the medium term. They also need some notion of how to reconcile the possibly conflicting signals which the foreign exchange market may be giving to their price stability objectives.

We will return to this issue below, when we discuss policy measures. For the moment it is sufficient to observe that exchange rates in emerging countries are not well anchored by widely-accepted stable views about the “fundamentals” or a long track-record which can

⁸ Emerging countries are not alone in being reluctant to see their exchange rates appreciate: ECB Chairman Trichet called the appreciation of the Euro in 2004 “brutal.”

⁹ Keynes (1929) wrote about this issue as the “transfer” process.

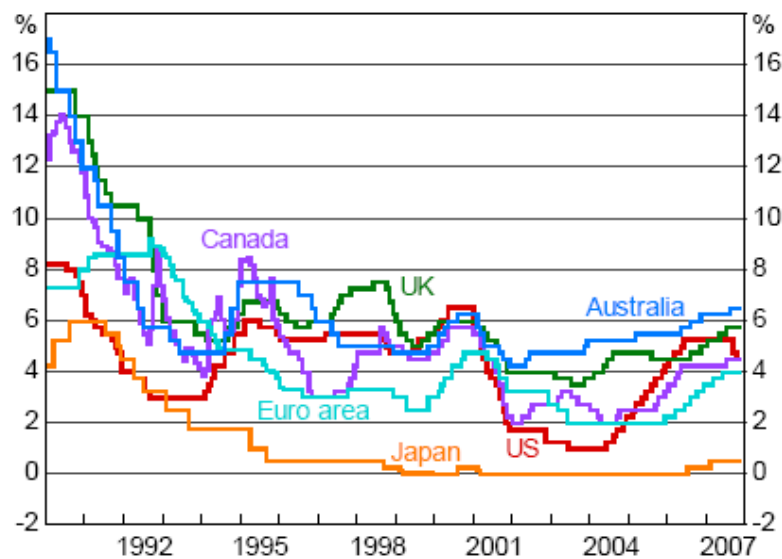
establish the parameters of a mean-reverting process, and while memories of the huge movements during the 1997 crisis remain, exchange rates will be vulnerable not just to short-term volatility, but to sustained misalignment.

(c) Loss of Monetary Control

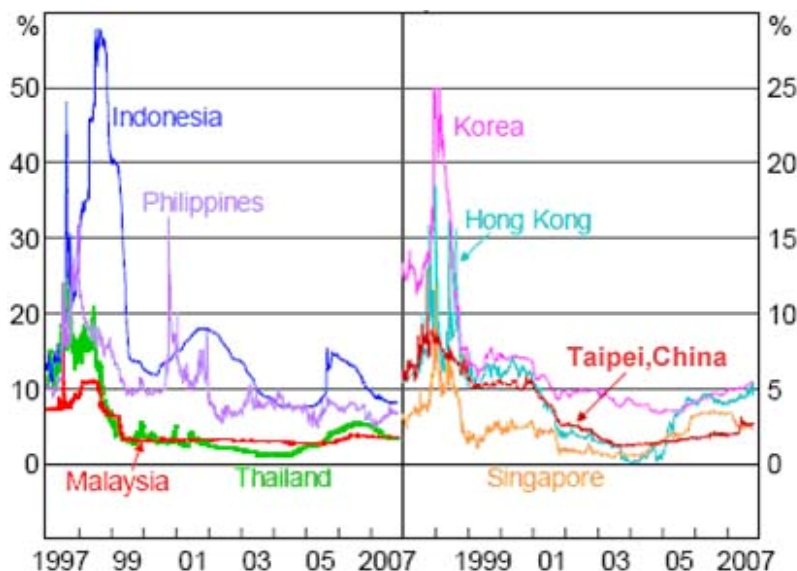
The “Impossible Trinity” was a warning that countries could not simultaneously have open capital markets, a fixed rate, and independent monetary policy. A floating rate would free up monetary policy, but interest rates and the exchange rate would be governed by uncovered interest parity (UIP): the interest differential had to remain equal to the expected change in the exchange rate. Thus, if interest rates were altered for domestic purposes, the exchange rate would move in response, mapping out the overshooting path prescribed in Dornbusch (1975). The corollary was that the exchange rate could not be influenced without changing the domestic interest rate.

Meanwhile, in the real world, major countries with a high level of integration into world financial markets experienced decade-long periods with substantially different interest rates (see Figure 2). US and Japan had an average differential of more than 300 basis points—with the US rate being three times the Japanese rate—for most of the past fifteen years. It is true that these countries had floating rates, but there was no sign of the Dornbusch portfolio equilibrating process at work. It would have required a once-off step “overshooting” depreciation of the yen followed by a steady appreciation. Instead, the cross rate has fluctuated between 90 and 150, with three wide cycles over this period.

Figure 2: Major Countries’ Policy Interest Rates



More relevant to this paper, the countries of East Asia have by and large been able to set policy interest rates where they wanted them, both before the crisis (when the exchange rate regimes were semi-fixed, and interest rates were routinely higher than world rates) and since (when the regimes are usually classified as a “managed float”): see Figure 3. Despite very large capital inflows, interest rates have not equalized, even for countries with relatively small financial sectors. In Thailand, with a fixed rate, foreign savings equivalent to 9 percent of GDP in the single year of 1996 were insufficient to bring interest rates into line with foreign rates.

Figure 3: Asian Short-term Interest Rates

Source: RBA and Bloomberg.

Why is reality so far from the message of the Impossible Trinity? First, UIP assumes perfect substitutability between domestic and foreign assets, even when these are denominated in different currencies. This would require much more than the absence of capital controls: it would need well-developed institutional connections, full information (often about countries with very different systems and stage of development), similar tax and legal regimes, similar risk appetites and, above all, a very clear view about the future path of exchange rates.^{10 11}

Secondly, UIP posits a very direct connection between capital inflows and looser monetary policy, because it envisages the credit multiplier process as being the basis of monetary policy, whereby a rise in foreign exchange reserves adds to base money, which is multiplied up automatically into credit growth. With financial deregulation, this model is no longer relevant, and it is now feasible, within broad limits, for the authorities to maintain the policy interest rate in the face of capital inflows.¹²

With that background, we can now ask if capital flows cause any loss of control over money supply. First, we can test this against the pre-deregulation common target–base money. This has special resonance for the Impossible Trinity, because this was the channel through which attempts at policy differentials would be frustrated. Table 1 shows M1 and M3 growth compared with growth in foreign exchange reserves. It is difficult to see any connection.

¹⁰ We now know (see Engel, 1995 and Burnside *et al.*, 2006) that not only does UIP not give any guidance on exchange rate movements, but the *sign is often wrong*: investors usually make a good profit when they invest in high-interest-rate currencies because in addition to the higher interest rate, they usually get an appreciating exchange rate. While forward cover is sold and priced on the basis of the interest differential, no one regards the forward rate as a good predictor of the future movement of the exchange rate (not, at least, since Meese and Rogoff, 1983).

¹¹ Despite persistent profitable interest differentials, capital flows have not arbitrated away the differences. Following fifteen years of pathetically low returns on yen-denominated investments, Japanese investors still have less than 20 percent of their bond holdings, and less than 10 percent of their equity holdings, in the form of foreign assets. IMF World Economic Outlook 2005 Chapter 3

¹² “Much of the discussion on sterilized intervention in Asia suffers from anachronism, since it applies measures consistent with quantity targeting to assess the behavior of central banks with interest-rate operating targets” (Ho and McCauley, 2008, p. 6).

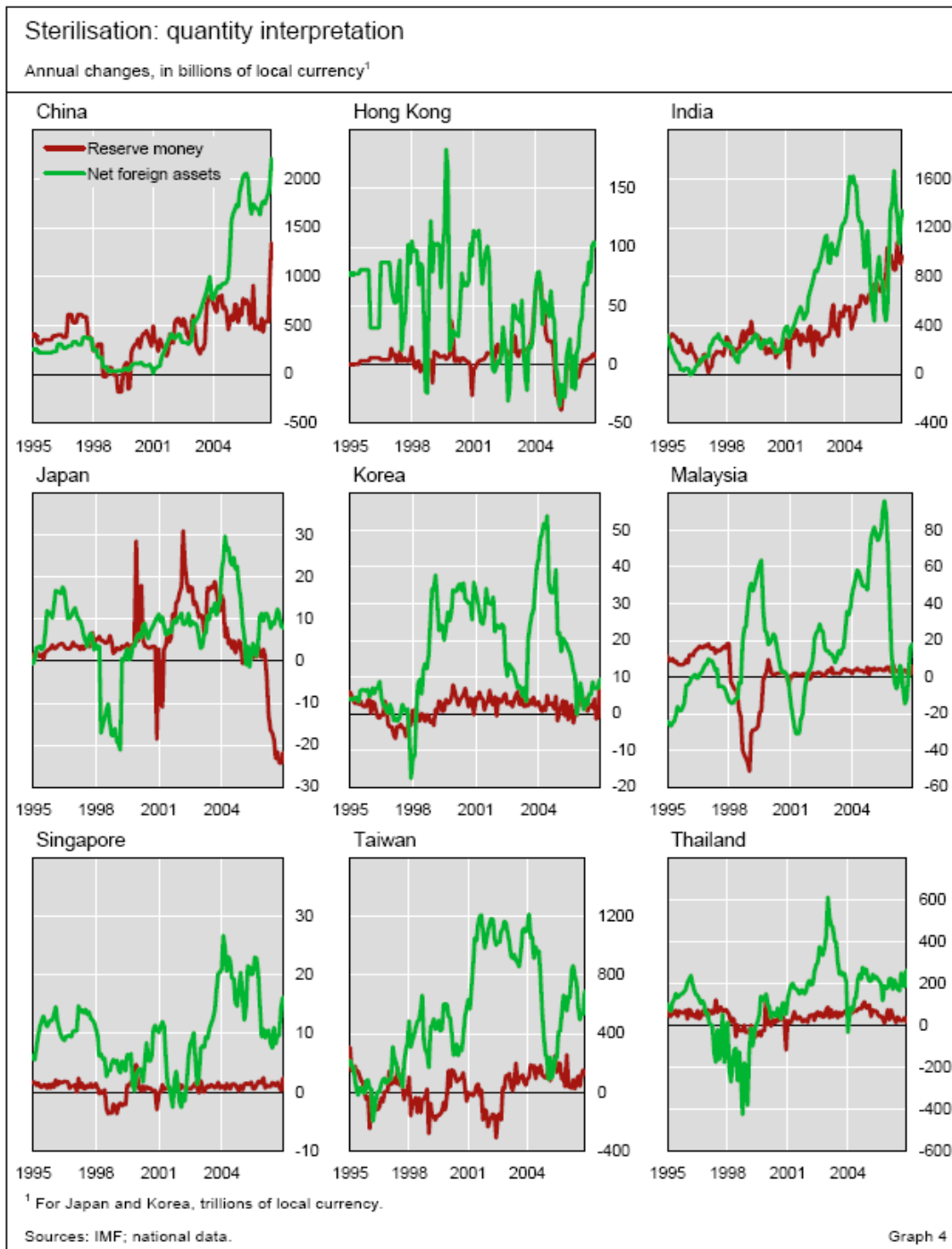
Figure 4 presents another view of this issue. With the possible exception of India, there does not appear to be any close link between additions to net foreign assets and base money.

Table 1: Change in Foreign Reserves, Money Supply (M2) and Reserve Money (y-o-y, %)

	1999	2000	2001	2002	2003	2004	2005	2006
Indonesia								
Change in Foreign Reserves	16.4	7.8	4.4	13.7	12.9	0.0	5.2	24.0
Change in M2	11.9	15.6	13.0	4.7	8.1	8.2	16.3	14.9
Change in Reserve Money	38.8	24.3	15.9	0.9	12.8	1.7	31.0	28.5
Malaysia								
Change in Foreign Reserves	19.7	7.4	4.2	13.0	31.4	50.3	6.0	17.6
Change in M2	13.7	5.2	2.2	5.8	11.1	26.1	15.6	17.1
Change in Reserve Money	26.3	9.4	3.3	6.4	6.9	10.0	5.1	10.6
Philippines								
Change in Foreign Reserves	43.1	1.4	2.9	1.1	2.4	3.9	21.4	25.7
Change in M2	19.3	4.8	6.9	21.0	4.2	10.2	10.3	21.4
Change in Reserve Money	20.6	6.8	3.5	12.8	5.5	9.8	9.3	61.0
Thailand								
Change in Foreign Reserves	18.2	6.0	1.1	17.6	8.0	18.5	4.2	28.8
Change in M2	2.1	3.7	4.2	2.6	4.9	5.4	8.2	6.0
Change in Reserve Money	28.5	18.6	5.7	13.6	11.9	12.4	5.1	2.2
Korea, Rep. of								
Change in Foreign Reserves	42.4	29.9	6.9	18.1	28.0	28.2	5.7	13.6
Change in M2	5.1	5.2	8.1	14.0	3.0	6.3	7.0	12.5
Change in Reserve Money	37.6	0.9	16.3	15.7	7.3	4.8	11.5	19.9
China, People's Rep. of								
Change in Foreign Reserves	5.7	6.7	28.1	35.0	40.2	50.6	33.7	30.1
Change in M2	14.7	15.4	14.4	16.9	19.6	14.5	16.7	16.9
Change in Reserve Money	7.3	8.5	9.2	13.3	17.1	11.4	9.3	20.8
India								
Change in Foreign Reserves	19.5	16.0	21.0	47.5	46.2	28.0	4.2	29.4
Change in M2	17.1	15.2	14.3	16.8	13.0	16.7	15.6	21.6
Change in Reserve Money	11.4	7.7	10.2	9.3	13.8	16.3	14.9	18.5

Source: International Financial Statistics (IMF).

Figure 4: Foreign Exchange Reserves and Base Money*



*Figure 4 taken directly from Ho and McCauley, 2008.

Why is this linkage so weak? First, the process of sterilization seems to have been quite effective. In practice it is relatively easy for central banks to sterilize excess base money in a deregulated system, as banks have no alternative use for it if they are already supplying all the loans that are demanded at the going policy-based interest rate. In any case, where the interest rate is the policy instrument, there can be a great deal of slippage between base money and credit (which is the money variable that impinges directly on economic activity). If the authorities have set the interest rate structure, this will determine the rate of credit expansion, and excess base money may not have much effect on credit growth: it remains as unintended excess reserves in the banks' balance sheets (c.f., Japan in 2001-2004 and Indonesia in 2005-6).

We can also examine whether the authorities are able to maintain their policy interest rates in the face of a large build-up in foreign exchange reserves. Ho and McCauley (2008) conclude that: "Central banks with explicit short-term interest rate operating targets or official rate corridors (for example, in India, Indonesia, Republic of Korea, Malaysia, the Philippines and Thailand) were able to manage money market liquidity such that the relevant interest rates did not fall and stay below their announced targets, notwithstanding bouts of foreign exchange purchases."¹³

It is possible that the authorities would have preferred higher interest rates and trimmed their setting in the hope of discouraging some of the excessive capital inflow. But if they did trim their policy instrument, it does not seem to have stopped them from achieving their final objective—low inflation. So far this century, despite very large capital inflows, inflation has by-and-large been contained (although the People's Republic of China [PRC] may represent an unfinished story). Ho and McCauley (2008) conclude:

"All in all, Asia during the period under consideration did not provide evidence for the well-known argument that large-scale reserve accumulation would be inflationary. The top reserve accumulators, be it in absolute terms (PRC and Japan) or in relative to GDP terms (Singapore; Malaysia; Taipei, China; and PRC), did not experience notably larger rises in inflation over the period 2002-2006 compared to economies that accumulated little reserves.

More strikingly, there is in fact an inverse relationship between reserve accumulation and average inflation performance in Asia over the same period. The top reserve accumulators all had relatively low inflation or even deflation. In contrast, two economies that saw the least reserve accumulation (Indonesia and the Philippines), given currency weakness through 2005, were the ones that over-shot inflation targets and experienced the highest inflation in the region. This inverse relationship is even more evident if one juxtaposes the inflation rate in 2001 (i.e., the initial condition) with the subsequent degree of reserve accumulation." (p. 11)

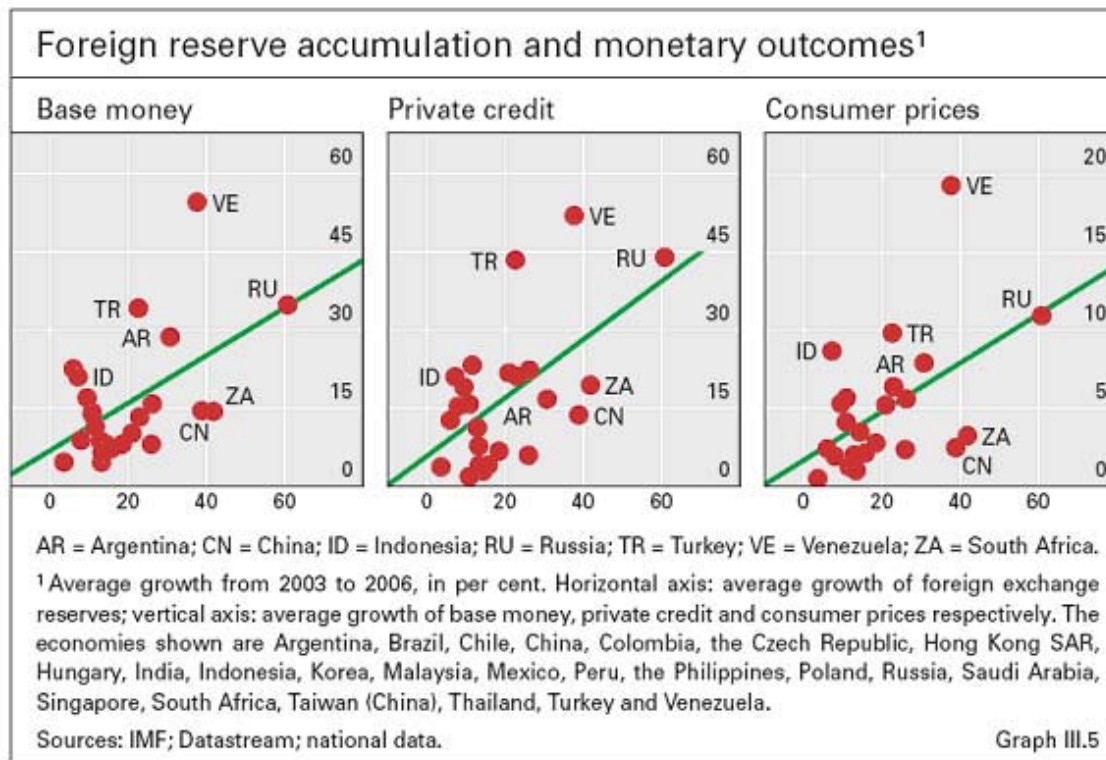
Not everyone shares this assessment. The BIS 2007 Annual Report, using a wider range of countries, claims to see some relationships between, on the one hand, growth of foreign

¹³ Ho and McCauley emphasize that their results may reflect the particular period under analysis. Earlier exploration of this issue by the IMF (Schadler et al., 1993) report similar results; "In fact, contrary to the fears of policymakers, surges in capital inflows did not, in general, produce concomitant increases in money supply" (p. 23).

exchange reserves and, on the other, base money, credit and inflation (see Figure 5). It has to be said, however, that these look to be pretty tenuous relationships, relying on a couple of outlier countries for their visual impact, with little general explanatory power.

The IMF, stuck as usual in a decades-old paradigm, still wants to test the Impossible Trinity in terms of the relationship between base money and credit growth (see IMF World Economic Outlook, October 2007).

Figure 5: Foreign Exchange Reserve Accumulation and Money*



*Figure 5 taken directly from BIS 77th Annual Report.

2. Flighty Volatile Capital: Sudden Stops

If a flexible exchange rate is not well anchored by expectations and a well-established history of mean reversion around some longer-term trend, “sudden-stop” capital reversals are a constant danger. As capital leaves in response to a disturbance or change in confidence, it drives down the exchange rate, causing a vicious cycle as more capital leaves in response to this fall.

When these investors flee, they are not easily replaced by other foreigners. These investors in emerging countries are on the frontiers of fund-management, not the mainstream. Few other foreigners can be persuaded to invest by a modest fall in the exchange rate because

the exchange rate is not well anchored and there is no general perception of what the “right” rate is.¹⁴ Capital inflow in emerging economies is binary: it is either on or off.

Such sudden outflows require a huge and painful adjustment process. When the capital flow is inelastic in response to a lower exchange rate, the adjustment has to take place largely in terms of *income falls* (reduced absorption) which, through reduced imports, are the only path by which the current account can be quickly brought into equilibrium with the now-reduced foreign funding. The exchange rate cannot produce a quick response by “switching,” so the equilibrium has to be achieved by painful “adjusting.”

To illustrate the point, let us compare Australia and Thailand during the Asian crisis. The fall in the Australian dollar was not, of course, as great as in Thailand, but it was nevertheless very substantial—close to 30 percent. The relationship between this exchange rate fall and capital flows was, however, quite different, for reasons we will explore in a moment. But first, let us look at the data. Figure 6 shows the huge turnaround in capital flows in Thailand (amounting to well over 20 percent of GDP, from an inflow of nearly 9 percent in 1996 to an outflow of 13.6 percent in 1998. This contrasts with Australia (shown in Figure 7). At least in this annual data, there is no sign of *any reversal of capital at all* in the case of Australia, despite the significant fall in the exchange rate: the inflow was actually larger in 1998 than the previous average.¹⁵ Thus for Australia the fall in the exchange rate was a threat to inflation (which in the event came to be seen as a tolerable threat, as the pass-through was much slower/smaller than had previously been thought), but not to capital flows. Relaxed about the threat to price stability, the Australian central bank was prepared to let the exchange rate fall without raising interest rates in its defense.¹⁶ The result was that the real economy was largely unaffected (if anything, it was stimulated by the lower exchange rate). The Thai authorities, on the other hand, were forced to raise interest rates in an economy already put in free-fall by the need to trim the current account to the available (hugely reduced) foreign funding. Clearly there is a different relationship between exchange rate weakness and capital flows.

¹⁴ I have described it (Grenville, 2004) as like trying to sell discount tickets outside a theatre which is already ablaze, with the patrons streaming out.

¹⁵ It is worth noting that there was no discernable outflow in the earlier exchange rate “crisis” in Australia—the “Banana republic” episode of 1986, when the exchange rate fell 35 percent without any capital outflow, despite the relative novelty of the exchange rate regime, which had floated only eighteen months earlier.

¹⁶ The central bank had the added advantage that it could be seen “to be doing something,” in the form of foreign exchange market intervention.

Figure 6: Thailand: Capital Flows

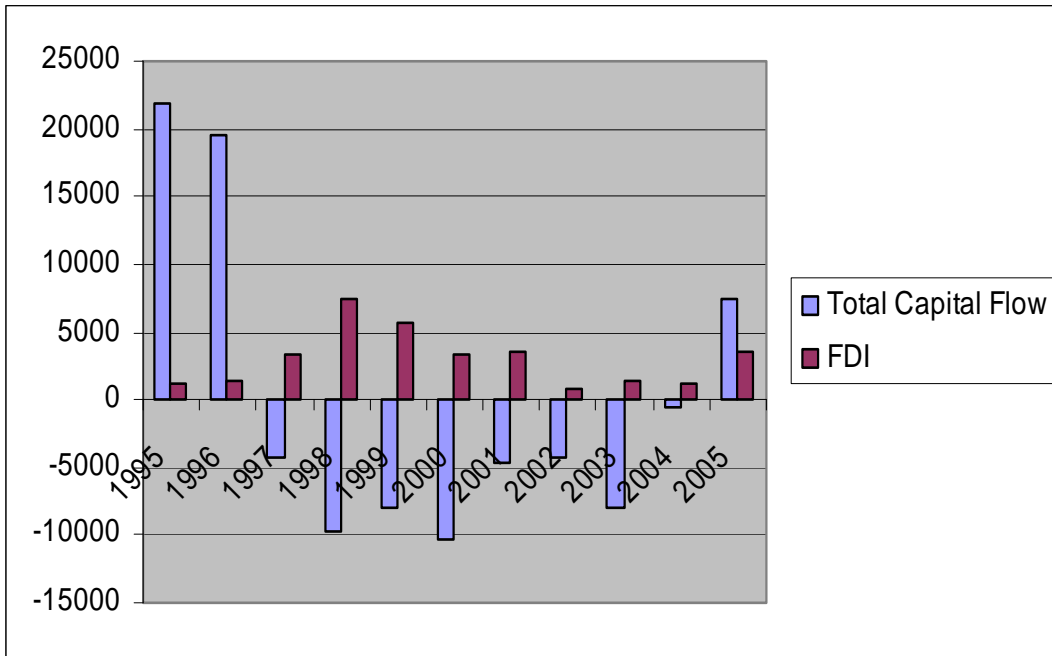
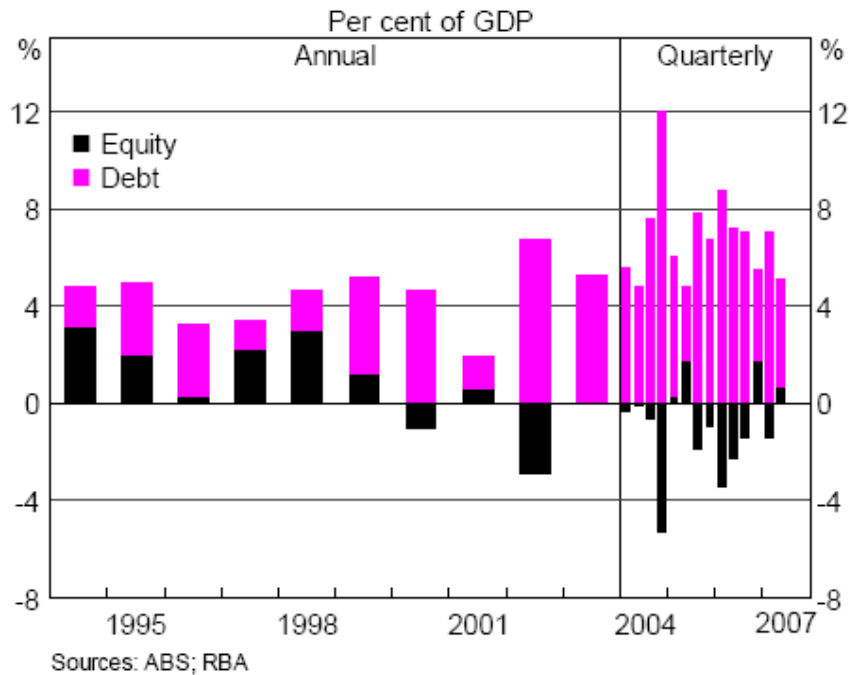


Figure 7: Australia: Capital Flows



Others countries provide similar comparisons. Cabellero *et al.* (2004) argue that the different behavior of Chile, compared with Australia, was not caused by different views on the inflation danger (the pass-through in both countries is similar), but rather was aimed at pre-empting capital outflow which would be much more likely to happen in Chile (fewer opportunities to diversify risk through derivatives), and do more damage when it did (commercial balance

sheets are quite exposed to exchange-rate risk).^{17 18} Hausmann (1999) compares Mexico and Australia: in Mexico's case it is not clear whether the interest rate increase was a response to the inflation threat or designed to encourage capital to remain, but the capital flow behavior in the two cases is clearly quite different.

This difference between Mexico, Chile, and Thailand, on the one hand, and Australia (and similar countries) on the other is the central policy issue: what is it that makes investors prepared to hold their positions^{19 20} in the case of Australia, but not with the other countries? It is not that all investors have somehow covered their currency exposures in the case of Australia but not in Thailand: Australia has had a long history of current account deficits and this cumulated inflow means that someone (in Australia's case, foreigners) is holding a very substantial currency exposure, which must give them concern as the exchange rate falls. Caballero *et al.* identify the difference as "country trust," as distinct from "currency trust":

Currency-trust describes the degree of confidence foreign investors have in holding assets denominated in the currency of the particular country. It indicates that investors believe currency movements will not be used to expropriate their investment but also that the central bank has enough control over the currency that random shocks are unlikely to lead to perverse exchange rate dynamics. In this way currency-trust is seen to be related to the concept of inflation credibility. Country-trust describes the degree of confidence foreign investors have more generally in the country, incorporating the commitment of the country to repay debts, corporate governance, the financial system and the economic stability of the country. Importantly, country-trust means that there is no need for highly specialized knowledge to invest in the country (for example about government and institutions). (Caballero *et al.*, 2004, p. 2)

Others would describe this differently, with different characteristics. They might talk in terms of institutions and the environment of law and governance. Others would emphasize that the central issue is the disparity in size between the financial markets of the emerging countries and those of the mature countries which are the source of the disruptive flows (see Volcker, 1999; Richards, 2002; and Runchana, 2007). Still others will argue that at each stage of the exchange rate fall in Australia, foreign investors thought that the rate had fallen enough and there was no expectation of a further fall.²¹

¹⁷ "In Chile there was widespread fear of a capital flow reversal. Net capital outflows could lead to a balance of payments crisis that would turn out to be much more costly than the contraction brought about by high interest rates. Contractionary monetary policy was seen as a way of reducing the need for external financing (by reducing domestic absorption) and the extent of the capital flow reversal (by sending a pragmatic signal to investors)" (Caballero *et al.*, 2004, p. 26).

¹⁸ See also Ortiz's (2000) discussion comparing Australia and Mexico. He identifies different inflation pass-throughs as an important issue.

¹⁹ Or, if they do not, other investors take their place (and their exposure).

²⁰ The United States provides a more recent example of stable capital flows. Foreigners' purchases of mortgage-backed securities funded almost one third of the US capital inflow in 2006. When risk-ratings were re-assessed starting in mid-2007, foreigners sold these assets but continued to hold dollar-denominated assets (IMF Managing Director's speech Oct 2007).

²¹ Krugman makes the point this way: "But nobody who looks at the terrible experiences of Mexico in 1995 or Thailand in 1997 can remain a cheerful advocate of exchange rate flexibility. It seems that there is a double standard on these things: when a Western country lets its currency drop, the

3. Financial System Stability

It is hard to insulate the financial sector from these problems—“twin crises” are the norm (see Kaminsky and Reinhart, 1999). To start with, the capital inflow often comes through the financial sector, intermediated by banks or finance companies. Even where it does not, the banks’ customers—the companies whose balance sheets have been seriously damaged by the outflow—have borrowed from the domestic banks and they now routinely default not just on their foreign debts, but their domestic debts as well.

Both the vulnerability to capital reversals and the fragility of the financial sector reflect institutional and reputation weaknesses. The policy problem is that reputation and institutions²² cannot be built quickly or easily. The prescription is simply unattainable in the short or even medium term. While embarking on this journey towards deep and resilient financial markets, policymakers have to put in place strategies to cope with the journey. We turn, now, to that issue.

C. How Should Policy Respond?

We start from the presumption that capital flows, like trade flows, are beneficial to a country and that policy should facilitate them. In particular, there should be an acceptance that an appreciated exchange rate is part and parcel of absorbing the capital flows and bringing about the transfer of real goods and services. But where there are significant interest differentials, there is a likelihood of excessive inflows as countries become more financially integrated, and these flows are likely to be volatile. A country may not be able to absorb, in a beneficial way, all the foreign capital that it attracts, or may want to iron out some of the surges (Schadler *et al.*, 1993).

The policy responses might be grouped into two categories: those preventative measures done *before* the crisis, and those done to try to rescue or ameliorate the unfolding crisis. There is, however, substantial overlap, with some policy measures having a role before and after the crisis, with this role sometimes taking a different form. Let’s start by enumerating the policy options. First, the “before” options:

- “Sand in the wheels” to discourage inflow
- Capital controls or taxes on inflow (e.g., unremunerated reserve requirements)
- Strong prudential measures
- Hedging
- Fiscal policy
- Run current account surpluses
- Intervention to prevent the exchange rate overshooting prior to a crisis

Now, the “morning after” options:

- Higher interest rates to defend the currency
- Capital controls on outflows
- Better bankruptcy provisions and management of the private sector foreign debt
- Intervention to support the currency and soften the absorption adjustment

market in effect says ‘Good, that’s over’ and money flows in. But when a Mexico or Thailand does the same, the market in effect says ‘Oh my God, they have no credibility’ and launches a massive speculative attack” (Paul Krugman “Latin America’s Swansong” at <http://web.mit.edu/krugman/www/swansong.html>).

²² In the Douglass North (1990) sense of rules and norms which govern relationships between market participants.

As foreign exchange market intervention overlaps these two phases, we leave to a separate section the important discussion of how this intervention will influence the central bank's balance sheet.

1. Before the Crisis: Prevention

The two broad approaches here are to try to limit the inflow, and to prevent the exchange rate from overshooting in its appreciation.

(a) Sand in the Wheels

It would be possible to discourage the inflow by introducing various types of "sand in the wheels": unstable politics, arbitrary administrative or judicial decisions, poorly functioning institutions, obscure information and random market processes, resulting in wide and unpredictable fluctuations in the exchange rate. It goes without saying that policy should be aimed at *removing* such imperfections, not using them as a policy instrument to solve a problem of excessive inflows. This kind of "sand in the wheels" is simply inefficient and denies the emerging country the benefit of the cheaper capital available overseas.

We noted, in Section B.1(b) above, that maintaining exchange rate uncertainty and volatility is one way of discouraging inflows. While this sort of disruption is widely accepted as the main explanation for time-varying risk, it seems sub-optimal.²³

There is another price-based mechanism at work. The foreign investment bids up the price of domestic assets (not just equities, but debt and property). This helps foreigners achieve portfolio equilibrium as the yield on the assets is driven down towards the foreign interest rate. There are, however, two disadvantages for the recipient country. First, as asset prices rise, an asset bubble becomes likely. Second, domestic investment is encouraged by the asset price increase (Tobin's "q" operates), so the stance of monetary policy is undermined.

(b) Taxes on Inflows

Is there nothing better available in the policy armory to restrain excessive inflows? If we see the problem in terms of a price differential between the return on capital at home and abroad, policy might aim to ration the inflow while at the same time ensuring that the recipient country gets the full benefit of the fact that capital is available more cheaply in the world market: this is, after all, the usual benefit of globalization. If rationing is needed (and this is an issue of absorptive capacity), then a tax on inflows seems worth exploring, as it does the job and gives the benefit of the price differential to the home country (although, as usual, capacity to administer such a tax is an issue). The first measure might be to ensure that the foreign investment is fully taxed in the recipient country. International tax treaties aimed at avoiding double taxation tend to shift taxation out of the recipient country (where at most there is a smaller withholding tax), perhaps to some tax haven.²⁴ This may be hard to

²³ It might be noted in passing that inducing volatility or uncertainty into market prices is sometimes put forward as a desirable thing. This example from the IMF comes very close to advocating a volatile exchange rate in order to create risk: "Policymakers should continue to be pragmatic and allow for greater exchange rate flexibility in order to create two-way risk in the foreign currency markets and promote a rebalancing of growth where necessary, limiting any intervention to efforts to reduce volatility and ensure that market conditions remain orderly." IMF Regional Outlook Asia Oct. 2006, p. viii.

This seems perverse: reducing the uncertainty in exchange rate movements would reduce the risk premium, and if this results in too much inflow, it would be better to discourage this through some form of tax (with the revenue benefits) rather than through artificially inflating the risk premium.

²⁴ A casual observation of the implementation of dual tax agreements would suggest that they have been written by the investing countries rather than the capital-receiving countries.

change, but would at least ensure that taxation does not act as a distortion working against macro-economic stability. A comprehensive capital gains tax would seem to have the same virtue. While a rigorously enforced capital-gains tax may not prevent an asset bubble from forming, it may exercise some constraint and the revenue will help clean up the damage when it bursts.

One preemptive response to excessive surges of foreign capital might be inflow controls—Chilean-style unremunerated reserve requirements (URR).²⁵ Mainstream discussion of these still has the flavor that, just as “real men don’t eat quiche,” serious countries do not have URR controls. This seems puzzling, as objective assessments show them to have been modestly successful over the policy horizon²⁶ and they seem closely tailored to the requirement to discourage the least useful and most disruptive form of inflow—short term funds. The negative consensus surrounding URR has been unhelpful to their effective use. Financial markets, carrying the Impossible Trinity baggage, were unanimously critical when Thailand attempted to introduce URR in December 2006, triggering outflows. If URR are a legitimate policy response, they require more *in principle* support from the IMF (and some technical help in implementation might have helped, as well). To the extent that they are often thought to be effective only for relatively short periods of time (until markets find easy ways to by-pass them), such measures might be thought of as being relevant to surges and the cyclical issues (i.e., trying to get more of the impact of monetary policy back to the interest rate instrument) rather than the structural issue.

(c) Prudential Controls

To the extent that the foreign inflows are coming through the domestic financial system, there seem many opportunities for stronger prudential controls, driven by the by-now-well-established fact that prudential problems in the downswing of the cycle were largely created during the upswing.²⁷ Policy should be bold enough not only to recognize the incipient problems, but to act on them. There is a good case for prudential regulations preventing or greatly limiting the role of the core financial institutions (banks) in intermediating the foreign inflows. So one answer to the second leg of the “twin crises”—the collapse of the banking system—may be to prevent the banks (and their subsidiaries) from acting as intermediaries for the inflow, and subject their customers’ whole-of-balance-sheet exposures to detailed prudential scrutiny and proper reserving practices. As often occurs, doctrinal or philosophical views get in the way of good policy. In this case, there is a commonly voiced argument that prudential measures should not be used for macro-economic purposes, but this is a misunderstanding of the nature of the problems: it *is* a prudential problem which *also* happens to have macro-economic implications.

A more radical option would be to build a core of *narrow banks* (i.e., banks which would hold only government securities as assets). This would not only assure the safety of a core group of deposits, but could assure the stability of a basic payments system in the event of a financial crisis (for a proposal along these lines for Indonesia, see Grenville, 2004(b)).

²⁵ Because many commentators hold negative views about these, they may conveniently forget that many other countries used this sort of capital control before Chile did: Australia in the 1970s had “Variable Deposit Requirements” that were so powerful in their effect that they had to be abandoned.

²⁶ The IMF IEO (2004) concludes that URR temporarily allow domestic interest rates to be higher, that there is no significant effect on exchange rate; that the volume of capital inflow is reduced although this effect diminishes over time; and that the composition of capital inflows moves towards longer maturities.

²⁷ Tight loan-to-valuation ratios, cyclically variable provisioning requirements and limitations on the accepted value of security seem sensible measures. See Borio and Lowe (2002).

It might be worth noting that the types of deposit insurance widely introduced in Asia after the crisis (where small depositors are covered, but the larger depositors who make up two-thirds or more of the volume of depositors' funds are not protected) would have no effect in ameliorating a systemic crisis (see Grenville, 2006).

(d) Hedging

In the aftermath of the Asian crisis, there was a strong suggestion that the crisis could have been averted or greatly mitigated if only domestic borrowers had hedged their foreign exchange exposure beforehand.²⁸ To evaluate this, we need to separate the three different channels that come into play in a crisis. First, the *exchange rate* falls and this is a threat to inflation (which can lead the central bank to raise interest rates at a time when the economy is already weak). Second, the capital outflow requires an adjustment in the current account position to fit with the new (reduced) availability of external funding (we might call this the *absorption* effect). Third, the exchange rate fall administers a *balance sheet* loss to anyone with a currency exposure (which was so damaging to domestic corporations in the Asian crisis). With this three-fold distinction in mind, we can evaluate the effect of hedging. While it can shift the exposure around, the exchange rate vulnerability remains: if there is large capital inflow, then someone—either domestic or foreign—has taken on a currency mismatch. If hedging shifts the exposure from one resident to another, there would seem to be little macro-effect. If the exposure is shifted to foreigners, this shifts the *balance sheet* exposure to them and softens the effect of the crisis on domestic corporations. This may mitigate the crisis, but the remaining two effects—exchange rate fall and the need for current account adjustment through the absorption effect—remain, and may even be more severe. Foreigners will attempt to cut their exposure when the currency comes under threat, pushing the exchange rate down and creating the same pressure on inflation and the same need for current account adjustment in response to capital reversal.

A closely related debate goes under the catchy title of “original sin” (Eichengreen *et al.*, 2005) which puts the currency denomination of foreign debt as the central issue. Hausmann (1999) explains the difference between Mexico and Australia (both big foreign borrowers, but one fragile and the other not) in terms of the ability of Australia to borrow in its own currency, while Mexico (having “original sin”) had to borrow in dollars, leaving its borrowers vulnerable to an exchange rate depreciation. This raises the same issues as discussed in the previous paragraph. Unless it can be shown that foreign investors are more stable holders of currency exposure than domestic borrowers, the vulnerabilities remain, whoever holds the exposure.²⁹

Our analysis questions the conventional wisdom of encouraging countries to shift the exchange risk to foreigners, thus ridding themselves of “original sin.” Certainly, this shifts the *balance sheet* damage of a depreciation to foreigners. But the country and its investors pay a significant premium for this risk shifting. Just as a Japanese investor would have been much better off by investing in Australian dollars,³⁰ an Australian borrower would have been significantly better off borrowing in yen over this period. Shifting the currency risk to foreigners gives them the benefit of the difference between the low international rates and the high domestic rates. Why is this universally regarded as good policy?

²⁸ For a recent example, see IMF (2007): “these countries had accumulated large unhedged foreign exchange liabilities, as domestic interest rates were higher than international rates and very tightly managed fixed exchange rates had conveyed a false impression of no exchange rate risk” (p. 24).

²⁹ On these issues, see also Goldstein and Turner (2004).

³⁰ A Japanese investor who invested 100 yen at the Japanese official policy rate at the start of 1990 would, by April 2007, have 124 yen. If she had exchanged it into Australian dollars and invested at the corresponding official rate in Australia, by April 2007 her investment, converted back to yen would have been 265 yen, a return nearly seven-fold the home alternative.

(e) Fiscal Surplus

The one policy prescription which seems to achieve wide support in theory if not in practice is to respond to excessive capital inflow by shifting the budget in the direction of surplus.³¹ This prescription seems to rely on the Mundell-Fleming IS/LM framework: a budget surplus will shift the IS to the left, lowering interest rates and discouraging capital inflows. This seems to fail on two levels. First, the IS/LM framework no longer captures the way monetary policy operates. The authorities set the short-term interest rate and have no reason to change this in the face of a large budget surplus and a leftward shift of the IS. Longer-term interest rates are set by the Wicksellian natural rate, which does not change. Even if interest rates *did* fall, the capital flows facing the countries of East Asia seem to be fairly interest-inelastic, as they are now dominated by FDI (including direct purchase of assets such as infrastructure) and portfolio flows into equities. If this is the right framework, then the extra savings from the budget will shift the saving/investment balance and, *pari passu*, the current account towards surplus. If the same quantity of capital inflow has to be brought into equilibrium with a smaller current account deficit, this would seem to put *upward* pressure on the exchange rate, the exact opposite of the desired result.³²

(f) Run Current Account Surpluses

In their broad order of magnitude, the capital inflows into East Asia in the past five years have been around the same as in the first half of the 1990s, but their absorption has been fundamentally different. In the 1990s, for better or for worse, there were corresponding current account deficits, so the capital flows were transferred in terms of real goods and services. In contrast, and perhaps reflecting the trauma of the Asian crisis, these countries have run current account surpluses for the past decade, so the net inflows have, roughly speaking, gone straight into official foreign exchange reserves.

This makes the countries much less risk prone (see the informal risk ranking in *The Economist* on 17 November, 2007, page 76). This has been achieved by a combination of restrained growth, lack-luster investment climate and exchange rates which have been held down by intervention. This may be a natural reaction and aftermath to the crisis, and a significant reserve build-up can be justified (see below). As a longer-term strategy, however, it is mercantilist and ignores the need for maximizing growth opportunities.

(g) Intervention

Can the authorities use foreign exchange market intervention to prevent the exchange rate from rising too much in the pre-crisis period? If it does not rise too much, then it will not fall much. This is where policymakers need some operational notion of what the “right” exchange rate is. Probably the least palatable message that comes out of this discussion is that the authorities should be ready to allow the exchange rate to appreciate. They need to resist opposing the ongoing underlying structural appreciation and the appreciation which is the normal part of monetary policy during the upswing of the cycle. If they can identify any further overshooting, there is a fair chance that intervention will, at least, do no harm and will turn out to be profitable for the central bank. Topping and tailing the cyclical overshooting of the exchange rate seems not only possible, but desirable. This is not a doctrinal issue,

³¹ See, for example Schadler et al. (1993)

³² Sometimes this argument is confused with the idea that the capital flow has caused excess demand and thus a fiscal surplus will fix the problem. Of course in a simple Keynesian sense a fiscal surplus reduces demand. But in the context of capital flows, we need a clearer specification of the problem. A capital flow matched by a current account deficit adds as much to supply as to demand, and so does not cause excess demand. The inconvenient aspect of the inflow is the upward pressure on the exchange rate needed to bring about the real transfer, in the form of a current account deficit, and a fiscal surplus would not seem to help here unless it lowers interest rates and discourages inflows.

simply one of operational capacity. Whether or not it changes the path of the exchange rate much, it gets policy to focus on the right issue—has the exchange rate overshoot? The justifiable concern that the exchange rate may overshoot would suggest some variant on the Williamson band-basket-crawl (BBC) (see Williamson, 2000).³³ This has, in a fairly mechanical form, some of the characteristics of the Singapore exchange rate approach, which permits quite aggressive and determined intervention, but normally only when the exchange rate has moved significantly away from what is seen as the medium-term equilibrium.³⁴

Of course, any intervention has to be kept consistent with the monetary stance but, as we noted in Section 2, this is less difficult in practice than the Impossible Trinity implies.³⁵ The threat to the stance of monetary policy is more likely to come from a reluctance to keep interest rates at the proper level, rather than the use of intervention in the foreign exchange market.

2. Managing a Crisis

So much for prevention. When this fails and the “sudden stop” is impending or has begun, central banks have three possible responses: raise interest rates, intervene in the foreign exchange market, or impose capital controls.

(a) Interest Rates

Higher interest rates can help to retain fleeing capital, but not often, and never when the exchange rate fall is accompanied by a financial crisis (Goldfarjn and Gupta, 1999). During the Asian crisis, the reversals in Thailand and Indonesia were dramatic, and could not be

³³ Even recent IMF analysis still hankers after the simple world of the Impossible Trinity. Here is an example from the support material for the 2006 Singapore Annual meeting: “In fact, in the ‘impossible trinity’ view, an economy can have only two of the following: an independent monetary policy, a fixed exchange rate, and capital account openness. In the textbook version, a monetary loosening to support GDP growth, for example, would trigger incipient capital outflows that would put downward pressure on the exchange rate peg and lead to an unsustainable drawdown of official reserves. Something has got to give.

Capital controls do not offer a durable way out of the dilemma. A margin for policy maneuver can perhaps be reconstituted by recognizing that capital account openness is not an all-or-nothing proposition: capital flows can be managed through capital controls. While attractive as a tactical solution, this approach has limitations in practice. Capital controls may provide temporary ‘breathing space’ for the pursuit of domestic policy objectives but their long-term effectiveness is questionable in sophisticated global financial systems. More importantly, barriers to capital mobility entail costs in terms of a less efficient allocation of international savings and the foregone benefits of the diversification provided by unencumbered trade in assets.” IMF background paper for the Singapore annual meeting 2006.

³⁴ This does not imply, of course, that BBC would necessarily use the exchange rate as the instrument of monetary policy to target inflation, as Singapore does. Australian intervention practices also have some of these characteristics, in that substantial intervention takes place, but only if the exchange rate has departed significantly from what the RBA judges to be a sensible level. Whether or not a formally defined band is best (neither Singapore nor Australia have such bands) and whether this is made public are purely operational issues. A publicly announced band may help to anchor the exchange rate, but will also constrain the flexibility of the authorities in responding to shocks.

³⁵ The common textbook distinction between “sterilized” and “unsterilized” intervention reflects a confusion of operational practice. Any competent monetary authority will routinely sterilize an intervention through its daily liquidity management operations (otherwise system liquidity would be unbalanced). The substantive distinction should be between intervention which is supported by a change in monetary policy and one which is not. Obviously, supported intervention has a greater likelihood of influencing the path of the exchange rate, but the support may not be consistent with domestic monetary objectives.

countered by any realistically acceptable rise in interest rates. At an intuitive level, the central problem is that the prospect of an imminent depreciation will always outweigh the investors' higher running return. We shouldn't have had to learn this lesson in 1997: in 1992 the UK was unable to defend the sterling peg because the market knew that an interest rate defense was too politically painful to be maintained, and in the same year Sweden tried to impose 500 percent interest rates to defend the krona, ultimately unsuccessfully.

(b) Intervention

There is very little support for foreign exchange intervention in the academic literature, and it takes a brave (some would say foolhardy) central bank to stand against a serious bout of capital outflow. Nevertheless, this is what reserves are for, and if the authorities are not ready to use their reserves, then why bother to have them in the first place? Intervention has (at least) two aims:

- First, to discourage capital outflow by supporting the exchange rate.
- Second, to finance a continuation of the current account position, so as to avoid a forced turnaround which, in turn would force a sharp contraction in GDP.

While in practice these two aims are inexorably interwoven, they should be judged separately. Even if the intervention has no effect on the path of the exchange rate, intervention might well be justified by the extra time it buys for the absorption adjustment process to take place.

Why does intervention get such bad (academic) press? Once again it is tempting to put some of the blame on the strong presumption, held by many analysts, that the market always provides the right answer. Perhaps a stronger reason is that history provides plenty of examples of futile defenses of unsustainable exchange rates. The test, however, is not to lump together all the attempted defenses and to try to distil a single answer on whether intervention "works," but to identify *the circumstances* in which it could work, and test these. This is, unfortunately, not easy: we cannot know the counterfactual path of the exchange rate and there is an intractable identification problem, in that we cannot distinguish between the policy reaction (intervene when the exchange rate is falling) and policy failure (the exchange rate falls despite intervention).

What we do know is that some central banks have consistently made a handsome profit over time by attempting to "lop the peaks and fill the troughs" (see Andrew and Broadbent, 2004). Others such as Japan have had good (if unacknowledged) success. Whether they succeeded in lopping and filling is impossible to prove, but their profits suggest, at least, that private arbitrageurs are "leaving money on the table." The experience of Singapore during the crisis suggests that a well-functioning economy can protect itself against depreciation over-shooting through intervention. The key, in this and other successes, is for the authorities to allow the exchange rate to move a significant distance *before* attempting a determined and well-resourced defense (and even then to be prepared to shift the defensive lines rather than be overwhelmed).³⁶ This takes a high degree of expertise and experience, backed by good administrative arrangements. Not every country will be able to emulate Singapore's success.

³⁶ The practical dilemma for policymakers is this. If they intervene quickly, investors may interpret this to mean that the adjustment process has been staved off only temporarily, and will withdraw their funds. If the authorities stay out of the market while the adjustment occurs (or at least in the first major phase of the adjustment) there may be a better chance that investors will think, at every moment in time, that the adjustment is already complete, and will not withdraw their funds. The counter argument, of course, is that the authorities need to get in early with their intervention to avoid the build-up of downward momentum.

Whatever the arguments about the effectiveness of intervention in influencing the path of the exchange rate, there will still be a case for using reserves to smooth the absorption adjustment in a crisis, and in Section 4(e) below we will return to the issue of what is a sensible level of reserves to hold for this purpose.

(c) Capital Controls

The academic literature is similarly unenthusiastic about capital controls, although after to the Asian crisis there appeared to be increased support for inflow controls of the Chilean type, as mentioned above. It is hard to find any support at all for *outflow* controls, and again this may reflect the reality that the loudest voices come from the creditor countries. Despite the frequently heard assertions of the sanctity of debt,³⁷ it is equally hard to see the philosophical objection: every country has *domestic* bankruptcy rules which are invoked, in extremis, to sort out the relative rights of debtors and creditors when the debtor is insolvent. The subtlety here is that there are both private debtors and debtor countries, so the essence of the issue is how to keep the arrangement confined to the parties immediately involved. These “consenting adults” made an agreement, and when it falls apart, the effects should ideally be confined to them. Rapid recognition of bankruptcies in 1997 would have fundamentally altered the way the Asian crisis played out, especially in Indonesia. Private debtors would not have been in a position to buy foreign currency to stave off their creditors (and by so doing, drive down the exchange rate). Rather, their balance sheets (and their checkbooks) would have been in the hands of a bankruptcy administrator who, in due course, would have negotiated a settlement with the creditors.

Given the undoubted success of the Korean standstill on bank debt at the end of 1997 and the importance of this in restoring stability and confidence, it might be thought that this would become part of the normal policy armory. Not so. It is treated as a unique occurrence in unusual circumstances. It would have been impossible, it is said, to make deals with all the widespread creditors in the other cases. As a generalization, this is clearly nonsense: it could be done in the same way that domestic bankruptcy administrators work, by an administrator simply announcing that the business is insolvent, and having creditors come forward to register their claims, which are dealt with in good order. This would, however, require some international endorsement to avoid individual creditors jumping ahead in the line, and it has not been possible to get international endorsement of orderly debt resolution even in the far simpler sub-case of sovereign debt restructuring.

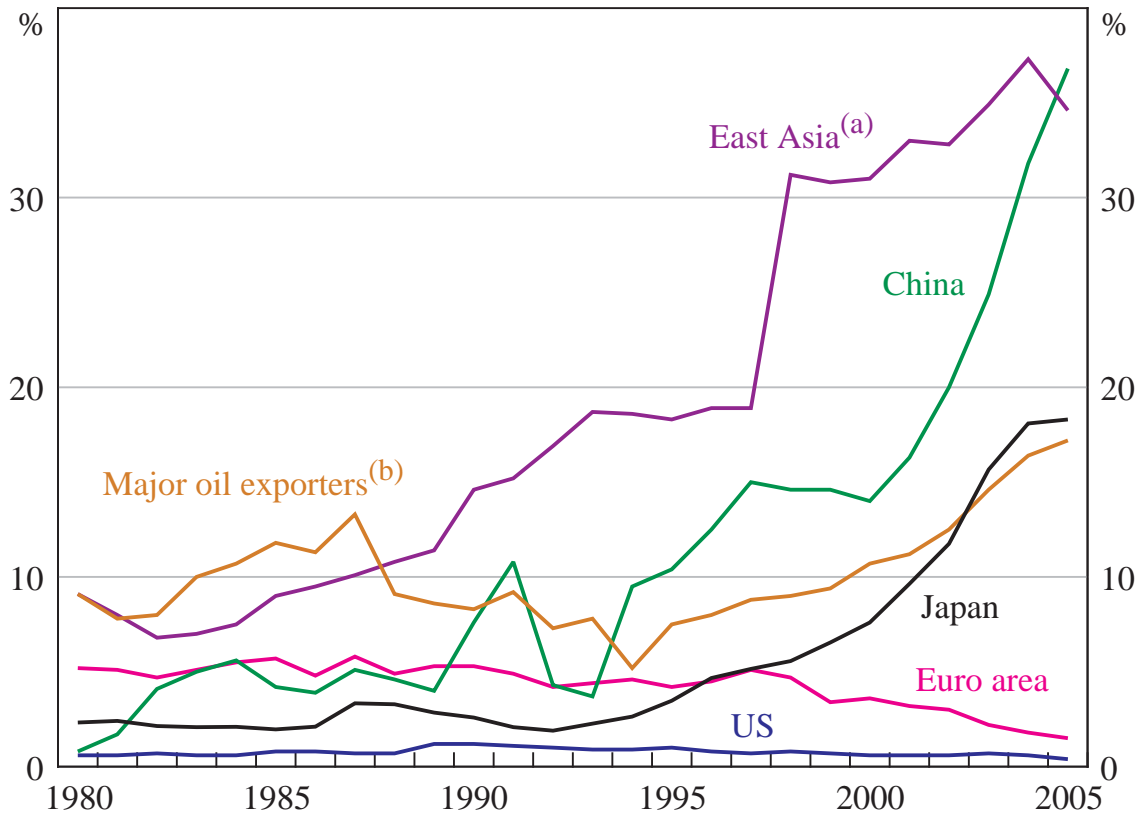
There is one further policy measure, related to foreign exchange intervention, which gets little discussion but seems to have been effective in Brazil in 1999 (see Bevilaqua and Azevedo, 2005). Rather than use its foreign exchange reserves to sell into the market, the government can issue debt denominated in dollars (through either new budget financing or by rolling over existing debt). This provides dollar-denominated assets which the market can use to provide currency cover for those who would otherwise have bought dollars in the foreign exchange market. Of course the government is taking on currency risk, so the Brazilian example should not be copied. This should only be done if the currency has overshot and is likely to appreciate.

3. Managing the Central Bank Balance Sheet

We have suggested, above, that intervention both to constrain overshooting in appreciation before the crisis, and to restrain the depreciation during the crisis, may well be justified. This involves significant foreign exchange reserves (see Figure 8), usually on the balance sheet of the central bank. This raises operational and policy issues which we address here.

³⁷ Most prominently from the Institute for International Finance, the mature country bankers' lobby group.

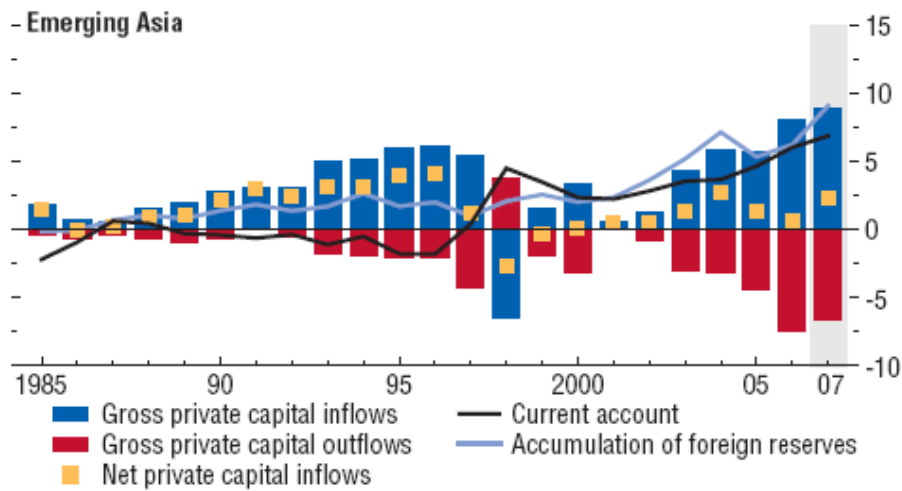
Figure 8: Reserve Assets, Percent of GDP



Notes: (a) Hong Kong, China; Indonesia; Malaysia; the Philippines; Singapore; the Republic of Korea; Thailand and Viet Nam.
 (b) Algeria, Iran, Kuwait, Mexico, Nigeria, Norway, Russia, Saudi Arabia, the United Arab Emirates and Venezuela.

Sources: RBA, IMF, IFS, WEO; World Bank, WDI.

Figure 9: Capital Flows and Reserves

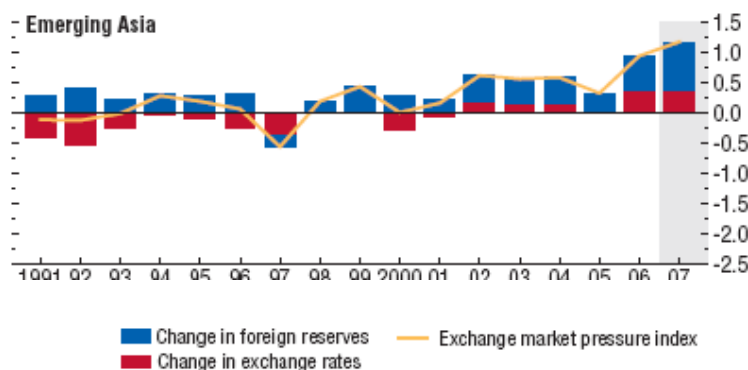


Source: WEO, October 2007.

Large capital inflows lead to intervention and increases in foreign exchange reserves (see Figure 9). One measure of the pressure on the exchange rate is shown in Figure 10. The reserve build-up presents two problems for the management of a central bank's balance sheet. First, the central bank has a foreign exchange exposure, often very large, which threatens its capital position in the event of appreciation. Second, the earnings on these foreign exchange assets are often smaller than the cost of issuing the sterilization instrument, putting the central bank's profit at risk.³⁸

Despite these two potential-cost factors, reserve holding may represent a proper policy choice: even where the central bank makes losses, the country as a whole may make offsetting gains. Alternatively, the investments may be thought of as a sensible self-insurance policy against foreign capital flight. If we consider that the cost of the crisis in Indonesia is reflected in a level of income which is around one third lower than it would have been had the crisis been avoided, and that this is an ongoing loss (it was not a "V" shaped recession), if reserves could have been used to avoid or mitigate such a crisis, the return on reserve-holding would be very high. But no central bank wants to go, cap in hand, to the government for a recapitalization if either of these factors puts its solvency in question.³⁹

Figure 10: Exchange Market Pressure Index



Source: WEO, Oct 2007.

Rodrik (2006) sets out the cost of foreign exchange reserve holding for emerging countries as a whole, putting it at around 1 percent of GDP (see Figure 11). He sees this as a self-insurance policy worth taking. Table 2 illustrates the magnitudes of these two problems for a number of East Asian countries. The ongoing cost of financing reserve holdings seems quite modest (smaller than Rodrik's estimates). Ho and McCauley (2008) confirm this view (see Figure 12).

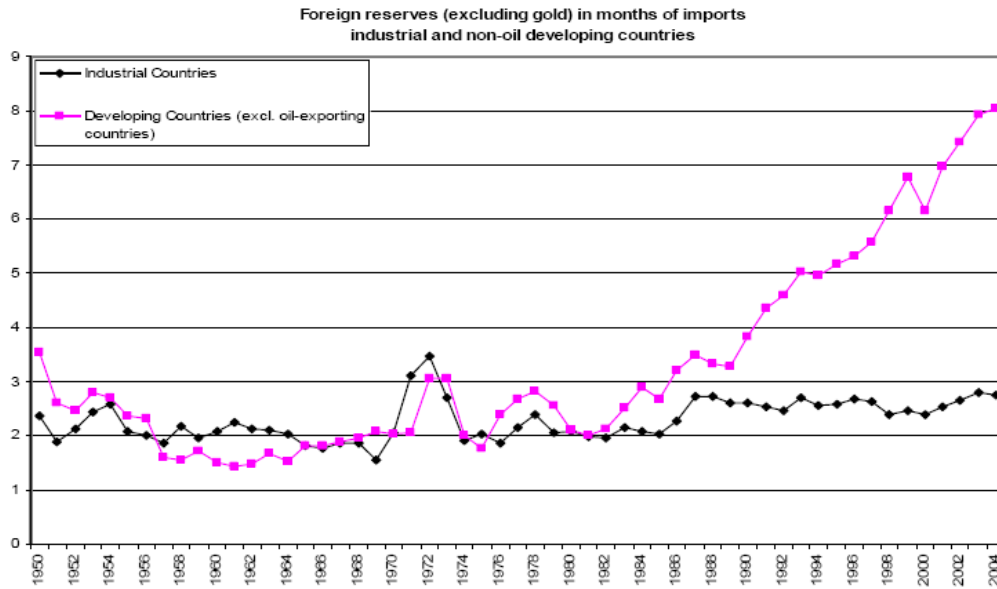
The risk of valuation losses in the event of an appreciation seems more substantial. A hypothetical scenario that might provide the broad order of magnitude is to imagine a 20 percent appreciation of the yuan, impinging on foreign exchange reserves equal to half of

³⁸ Of course, if uncovered interest parity held, the higher interest rate paid would be compensated by valuation gains on the appreciating foreign assets. If, on the other hand, the emerging countries have intrinsically higher interest rates (as suggested here), then there will usually be a holding cost reflecting this differential.

³⁹ The issues are made more complex by the accounting rules, which may in some cases bring favorable valuation changes into the profit and loss account (when, e.g. the foreign exchange reserves are 'churned' in market transactions), to be distributed to the government as dividends, thus creating a hostage to fortune when negative valuation changes occur.

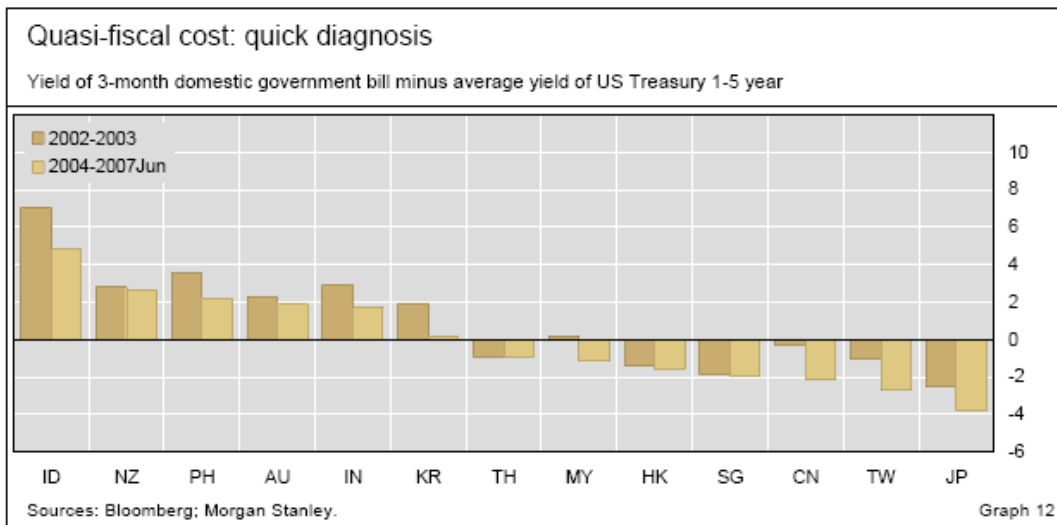
GDP. In this case, the accounting loss for the central bank would be equal to 10 percent of GDP.⁴⁰ Table 2 sets out some more detailed calculations.

Figure 11: Foreign Exchange Reserves



Source: Rodrik (2006)

Figure 12: Quasi-fiscal Cost of Reserves*



*Figure 12 taken directly from Ho and McCauley, 2008.

⁴⁰ The US dollar value of the reserves is unchanged, so it can be used to finance the same sized current account deficit.

Table 2: The Cost of Foreign Exchange Reserve Holding in 2006

	Cost of Funding the Reserves, Billion USD (As a Percentage of GDP) ^a	Cost of a 20% appreciation, Billion USD (As a Percent of GDP) ^b
Indonesia	2.967 (0.815%)	8.221 (2.257%)
Malaysia	-1.150 (0.772%)	16.426 (11.029%)
Philippines	0.087 (0.074%)	4.005 (3.407%)
Thailand	-0.138 (0.067%)	13.058 (6.329%)
Korea, Rep. of	-0.934 (0.105%)	47.776 (5.379%)
China, People's Rep. of	-27.648 (1.045%)	213.698 (8.080%)
India	2.640 (0.302%)	34.148 (3.909%)

a/ Total Reserves*(Yield of 3-Month Domestic Treasury Bill – Average Yield of US Treasury 1-5 Years)
b/ Total Reserves*0.2
Source: International Financial Statistics (IMF); Bloomberg; World Economic Outlook Database.

In one sense, these capitalization and profit issues are accounting problems which could be handled by some inventive inter-governmental accounting—through the addition of some government bonds to the central bank balance sheet. Just as central bank losses arising from support of a failing banking system must be swiftly made good by the budget without threatening central bank independence, so too revaluation losses should be made good swiftly and without condition.

This leaves open the more important policy issue of whether these foreign exchange exposures are in the nation's interest, and whether the investment in often-low-return assets is sensible. This issue seems unresolved in the literature, although we have moved beyond judging reserve adequacy by comparison with the imports bill (traditionally three months of imports), recognizing that the capital account is now where the threat lies.

One often-heard suggestion is the Guidotti Rule (Greenspan, 1999), which proposes that emerging countries should hold foreign exchange reserves equal to the debt that will fall due over the next year. If this is interpreted as the *longer-term* debt falling due over the next year, it might make some sense as insurance against difficulty in rolling over the long-term debt (and this may be the issue for Latin America). However, if the reserves are being held against the short-term debt liabilities (which would be the case in East Asia), it raises the issue of why the short-term debt was a good idea in the first place. The Guidotti rule is, however, a reminder that the old rules of thumb connecting recommended reserve holdings with imports are not relevant in a world where the shock comes to the capital account.

A more fruitful argument is found in Jeanne and Ranciere (2006), who note the role that reserves could have played in averting the dramatic fall in absorption which was forced on the crisis countries of Asia as they turned their current account deficits into surpluses in

order to meet the funding constraint. They note that, in a large sample of “sudden stops,” the average output loss was 4.5 percent of GDP in the first year and 2.2 percent in the second. Their model requires input of parameters covering risk factors and other unknowns and allows for little interaction between the level of reserves and the likelihood of a sudden stop, but seems to be the basis for a sensible approach to assessing reserve levels.

All this does, however, leave a huge policy issue largely unaddressed in this discussion. It might be possible to explain the build up of emerging economies’ foreign exchange reserves in terms of self-insurance against volatile capital flows. But when they amount to more than one third of GDP for the countries taken together, and for the PRC, to more than half of GDP, is it sensible policy for this to continue? A current account surplus of over ten percent of GDP and growing suggests a lack of sustainability, and the size of the potential valuation losses is a reminder that, seen in terms of self-insurance, the premium may turn out to be high. One often-proffered answer to upward pressure on the exchange rate—tighten fiscal policy—seems inappropriate for the PRC, with its existing huge saving surplus.⁴¹ Whether the answer is found in further freeing of capital outflow (which might involve significant public participation, as in the case of Singapore), or stimulus to domestic consumption, or more significant appreciation of the currency, remains in the realm of future policy challenges.

D. Conclusion

This paper leaves the policymaker with unanswered operational questions. What precisely is the right level of foreign exchange reserves for self-insurance in a world of unanchored exchange rates and volatile capital flows? Once that level is reached, what then? Allowing the exchange rate to rise has to be part of the answer, but how far? Can the International Monetary Fund’s renewed interest in exchange rate surveillance fill the gap, based on macro-balance, equilibrium REERs and sustainability calculations? Can this be linked into the supposedly deeply embedded relationships of saving and investment, using this as a basis for a view about the appropriate current account balance? If this can be used to identify the appropriate current account position, how can policy maintain capital flows at around this same size?

This paper does little more than clear the decks and set an agenda for more operationally focused research. Clearing the decks, however, seems important, as analytical thinking about these issues has been severely hampered by doctrinal blinkers. The Impossible Trinity, UIP and a strong predilection for the “magic of the market” has meant that in the decade following the Asian crisis, much of the expert advice being offered was simply not listened to. When pure floats are advocated, there is no discussion of how policy should conduct a managed float or manage foreign exchange reserve levels. When prudential rules are limited to micro balance sheet issues, larger macro implications of the behavior of the financial sector are ignored. When free capital flows are doctrinally believed to be optimal, there is no useful discussion of how countries might limit and restrain these flows. A practical research agenda would encompass the design parameters of a managed float, reserve holdings and intervention policies, including the possibility of using state-contingent assets and government foreign/domestic debt management as well as conventional reserves. It would provide an analytic framework for judging whether a current account was broadly appropriate. Finally, it would explore taxation constraints on surges of inflow (including URR), stronger (i.e., more intrusive) prudential measures, contingent controls on capital outflows, and better bankruptcy procedures, both domestically and for foreign debts.

There is no likelihood of a “twin crisis” in East Asia any time soon, as the countries of the region (whether by design or accident) have taken the narrowly conservative path of running

⁴¹ And, for that matter, much of the rest of East Asia.

current account surpluses and accumulating reserves. This seems neither optimal nor sustainable. With capital flowing “uphill” and foreign exchange reserves overflowing the coffers, the current conjuncture is not sustainable and increasing globalization will put further pressure on these imbalances over time. When East Asia returns to the more normal configuration of significant current account deficits, the benefits of such crisis preparedness will become apparent.

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