

**INTERNATIONAL RESERVE HOLDINGS BY DEVELOPING COUNTRIES:  
WHY AND HOW MUCH?**

**by**

**Ramkishen S. Rajan**  
School of Economics  
University of Adelaide, Australia  
E-mail: [ramkishen.rajan@adelaide.edu.au](mailto:ramkishen.rajan@adelaide.edu.au)

**May 2002**

## **1. Introduction**

Among the many economic indicators that central bankers, financial market participants and the financial press perpetually keep tabs on is the size of a country's international reserve holdings. This fixation with international reserves is, to a degree, understandable. Many developing countries lack easy access to international private capital markets from which they might supplement their reserves. In addition, many developing countries persist with some form of pegged arrangement in which the US dollar invariably occupies a large weightage. This is despite the fact that such pegged regimes have repeatedly proven to be susceptible to speculative attacks with calamitous impacts on the domestic economy. Why then do countries continue to favour some form of pegged exchange rate regime?

## **2. Fear of Floating**

Flexible regimes have experienced "excessive" volatility over the last few decades. It is admittedly quite difficult to define what exactly is meant by the term "excessive". However, a reading of the relevant empirical literature reveals evidence of excessive exchange rate variability to come in a number of forms. For instance, a number of surveys of foreign exchange (forex) market participants clearly indicate that short-term/high-frequency exchange rate movements are caused by "speculative" or "trend-following" elements rather than underlying macroeconomic fundamentals. The problem of destabilising speculation and consequent excessive or self-aggravating exchange rate volatility and dominance of fads and bubbles appears to be personified in developing countries, making a flexible regime especially unviable/unsuitable to them. This is particularly so since thin markets, which exist in

developing countries, imply that a few transactions can lead to extreme exchange rate fluctuations.

Even if it were accepted that flexible exchange rates often appear to exhibit greater volatility in high frequency data than would be warranted by the underlying fundamentals, why might such excessive volatility be of concern? Recent studies have offered evidence of a negative impact of exchange rate volatility on trade and investment. To the extent that investment has a significant positive impact on economic growth, declining investment will have an enduring adverse effect on the quantity of real resources. Even in the absence of a negative effect on the level of investment, exchange rate variability may have an adverse influence over the composition of investment since decisions could be based on disequilibrium prices.

Apart from studies linking exchange rate volatility to diminished trade, investment and growth, a new series of empirical studies finds that institutionally fixed exchange regimes in the form of a common currency stimulates trade which in turn boosts output<sup>1</sup>. As is common knowledge, proponents of the European Monetary Union (EMU) have used such an argument extensively in support of a single regional currency. Conversely, as regional countries become increasingly integrated through trade and investment, arbitrary shifts in comparative advantage and demand due to alterations in exchange rates may provoke political backlash and disrupt real intraregional linkages.

Notwithstanding the recent weakness of the Australian dollar, its successful experience with a floating arrangement, particularly in terms of holding up well

---

<sup>1</sup> See J. Frankel, and A. Rose (2000). 'Estimating the Effects of Currency Unions on Trade and Output', *Working Paper No.7857* (Cambridge, MA: NBER); R. Glick and A. Rose (2001). 'Does a Currency Union Affect Trade?: The Time Series Evidence', *Working Paper No.8396* (Cambridge, MA: NBER); and A. Rose (2000). 'One Money, One Market: Estimating the Effect of Common Currencies on Trade', *Economic Policy*, 15, 7-46.

during the East Asian crisis for 1997-98, has often been cited as evidence of the “superiority” of such a regime and has been prescribed as a panacea for other developing countries. Such an advocacy does not however pay due consideration to the fact that there are important structural differences between industrial countries such as Australia, on the one hand, and developing countries, on the other. For instance, industrial countries have well-developed and diversified financial systems that are able to minimise real sector disruptions due to transitory exchange rate variations (abstracting from the resource allocation costs of misalignments noted previously). Significantly, industrial countries are able to borrow overseas in their domestic currencies. Many developing countries are unable to do so, leading to an accumulation of foreign currency debt liabilities that are primarily dollar denominated and unhedged (i.e. “liability dollarisation”)<sup>2</sup>. In such circumstances, sharp depreciations in their currencies decimate the net worth of domestic banks and corporations with calamitous real sector effects. These negative balance sheet effects offer yet another explanation for the continued priority given to a high degree of exchange rate stability in developing countries. In other words, many developing countries are besieged by an acute “fear of floating”.

### **3. Cost and Benefits of Holding Reserves**

The seeming fear of floating by many developing countries highlighted above rationalises in part the importance they place on the size of and variations in their international reserve holdings. This is especially so as international reserves are, in essence, an inventory or insurance held against the uncertain future course of the

---

<sup>2</sup> This is commonly referred to as the “original sin” hypothesis, a term attributed to R. Hausmann (1999). ‘Currencies: Should there be Five or One Hundred and Five’, *Foreign Policy*, 116, 65-79.

balance of payments. Nonetheless, a basic paradox lingers. While many developing countries persist with pegged regimes, they have generally allowed for a relatively greater, albeit modest, degree of variability of their currencies according to market conditions. Yet the central banks in developing countries have appeared keen on bolstering reserves to historically high levels. Stated in another way, while the need to hold some level of reserves is clear, what is not nearly as apparent is the optimal size of reserves.

Theory has offered policy makers only limited guidance when it comes to managing international reserves. In the absence of strong analytic basis, a popular benchmark rule of thumb used by central bankers until the early 1990s has been to hold reserves that are sufficient for at least three months worth of import cover. But why not hold some arbitrarily large amount of reserves?

As with everything else, there is an opportunity cost of hoarding reserves. We make an attempt to estimate the potential opportunity cost of reserve accumulation so that this may be juxtaposed against the benefits. The computation makes two key assumptions. First, all reserves beyond the three months worth of imports are considered to be “excess”. We treat these “excess” levels of reserves as the opportunity cost of maintaining an open capital account. Second, the spread between the yield on foreign reserves (the US Treasury bill rate) is used as a proxy of the marginal cost of domestic funds and is taken to be 6 percentage points<sup>3</sup>. Under these assumptions, and as reported in Table 1, we find the annual cost of this “insurance policy premium” against financial market unpredictability to be of the order of 0.3 to

---

<sup>3</sup> Ideally we would like to have obtained data on an individual country’s market bond rates and estimated more exact spreads. It has been argued that argues that for a lot of emerging and developing countries this 6 percent spread is likely to be a conservative estimate of the true opportunity cost of holding reserves. See D. Rodrik (2000). ‘Exchange Rate Regimes and Institutional Arrangements in the Shadow of Capital Flows’ (mimeo, September).

1 percent of GDP for the five crisis-affected economies in East Asia in 1999. As a share of GDP, these costs are the highest for Thailand and Malaysia and least for the Philippines.

So the costs of holding “excess” reserves can be quite high. Yet the evidence clearly indicates that some countries accumulate reserves well beyond levels that would be deemed adequate by the simple import-based yardstick. Indeed, this is an age-old fact. In what became known as the “Mrs Machlup’s Wardrobe Theory”, Machlup suggested that the acquisitive characteristics of monetary authorities in terms of adding to their reserves resembled those of his wife in terms of clothes<sup>4</sup>. He argued that monetary authorities essentially looked to maximise their reserves. As such, the demand for reserves in any period could, according to Malchup, be characterised simply as being equal to the level of reserves in the previous period plus some growth factor no matter what the level of imports or any other underlying economic variable.

#### **4. Reserve Adequacy and Capital Account Crises<sup>5</sup>**

The seeming insatiable appetite for reserves noted above does not necessarily imply irrational behaviour by the countries concerned. The currency crises of the 1990s and beyond that have afflicted many developing countries have predominantly been crises of the capital account<sup>6</sup>. Accordingly, conventional current account based

---

<sup>4</sup> See F. Machlup (1966). ‘The Need for Monetary Reserves’, *Banca Nazionale del Lavoro Quarterly Review*, September.

<sup>5</sup> This section draws on a longer working paper by G. Bird and R. Rajan (2002). ‘Too Good to be True?: The Adequacy of International Reserve Holdings in an Era of Capital Account Crises’, *CIES Discussion Paper No. 0210* (University of Adelaide, Centre for International Economic Studies).

<sup>6</sup> See R. Rajan (2002). ‘Coping with Capital Account Crises: Financial Cooperation in East Asia’, *Economic and Political Weekly*, 37 (8), February 23, 704-6 and R. Rajan (2002). ‘Safeguarding Against Capital Account Crises: Unilateral, Regional and Multilateral Options

rules of thumb determining the adequacy of international reserve holdings (such as import cover) may severely downplay the actual quantity of reserves that are needed. The former deputy managing director of the International Monetary Fund (IMF), Stanley Fischer nicely summarised the importance of reserves in the era of capital mobility as follows.

Reserves matter because they are a key determinant of a country's ability to avoid economic and financial crisis. This is true of all countries, but especially of emerging markets open to volatile international capital flows...The availability of capital flows to offset current account shocks should, on the face of it, reduce the amount of reserves a country needs. But access to private capital is often uncertain, and inflows are subject to rapid reversals, as we have seen all too often in recent years. We have also seen in the recent crises that countries that had big reserves by and large did better in withstanding contagion than those with smaller reserves.. (pp.1-3)<sup>7</sup>.

In the aftermath of the East Asian crisis, the extent of short-term indebtedness has been found to be a key indicator of illiquidity and a robust predictor of financial crises. Consequently, the reserves-to-short-term external debt ratio is viewed as a useful indicator of the threshold at which investors lose confidence, linking the measure to the theory of currency crises. Pablo Guidotti, former Deputy Minister of Finance of Argentina, is credited with being the first to propose that countries should manage their external assets and liabilities in such a way as to be capable of living without foreign borrowing for up to one year. This “external balance sheet rule” implies that *usable* foreign exchange reserves must at least exceed scheduled external amortisation for one year. There are, however, two important limitations with this measure.

---

for East Asia’, in G. de Brouwer (ed.), *Financial Arrangements in East Asia* (London: Routledge), forthcoming.

<sup>7</sup> Fischer, S. (2001). ‘Opening Remarks’, IMF/World Bank International Reserves: Policy Issues Forum (Washington, DC, April 28).

First, Alan Greenspan, Chairman of the Federal Reserve Board of the United States suggested that the “Guidotti-rule” be refined by having a “liquidity-at-risk” standard which is somewhat similar to the value-at-risk methodology used by financial institutions<sup>8</sup>. Under this standard, a country’s external liability position would be computed across a wide range of possible outcomes, taking into account the full set of external assets and liabilities. An appropriate level of reserves would then be the one that provides a high probability that external liquidity will be sufficient to avoid new borrowing for at least one year. Second, the reserve-to-short term debt measure only gives an indication of a country’s vulnerability to an “external drain” but fails to capture the threat of an “internal drain” associated with capital flight by residents. The latter may be best captured by measures of broad money supply (M2).

Taking on board the Guidotti-Greenspan suggestion as well as the need to consider capital flight, Table 2 highlights recent computations of reserve adequacy for a subset of developing countries using two closely related measures<sup>9</sup>. The first incorporates both short-term external debt and a proxy for capital flight (part of M2) modified by a “probability factor” captured by a country risk index. This measure is more fully explained in the notes to the table. The second measure incorporates an additional cushion over and above short-term external debt so as to provide a time period for policy change before the reserves to short term debt threshold is reached (as discussed above). Both measures, which account for the type of exchange rate regime of the country under consideration, suggest that Brazil, Russia, South Africa, Turkey and Argentina held inadequate reserves in 1999, while a number of countries in Asia

---

<sup>8</sup> A. Greenspan (1999). ‘Currency Reserves and Debt’, remarks at the World Bank Conference on Trends in Reserve Management (Washington, DC, April 29).

<sup>9</sup> See J.A.H. De Beaufort Wijnholds and A. Kapteyn (2001). ‘Reserve Adequacy in Emerging Market Economies’, *Working Paper No.01/43* (Washington DC: IMF).

including India, Korea, Thailand and Malaysia actually held reserves that were significantly in excess of adequate levels by end 1999. Considering the sharp appreciation in reserve levels in these countries relative to short term external liabilities over the last couple of years, the size of “excess” reserves held by them ought to be have grown substantially.

## **5. Concluding Remarks**

While the Guidotti-Greenspan balance sheet rule is an important step forward in judging reserve adequacy in an era of international capital mobility, it does beg the question as to why short-term debt is useful in the first instance. As the Economist (September 23-29, 2000), “(i)t is rather as though a household with lots of cash sitting idle in a low-interest bank account was at the same time paying a much higher interest rate on its debt. It would make more sense to repay some of that debt” (p.90). More generally, an important limitation of such a reserve-hoarding policy is that it involves high fiscal costs as the country effectively swaps high yielding domestic assets for lower yielding foreign ones. In view of these high costs, some prominent economists have gone so far as to suggest that developing countries rethink the policy of openness to capital flows (other than those related to foreign direct investment)<sup>10</sup>.

Assuming, however, that countries do want to optimise subject to an open capital account, is there any way in which the liquidity yield from holding reserves may be generated without the need for individual countries to continue to accumulate them? Indeed, if capital outflows reflect a perception within private capital markets that a country is illiquid, reducing international reserves and therefore curbing

---

<sup>10</sup> For instance, see D. Rodrik (2000). ‘Exchange Rate Regimes and Institutional Arrangements in the Shadow of Capital Flows’ (mimeo, September).

liquidity further is hardly likely to be an effective strategy. Rapid reserve depletion has been one of the defining features of currency crises, and reserve levels *ex ante* have showed up as a significant variable in many studies examining the predictability of crises.

The foregoing suggests that countries need to look beyond domestic reserve and debt management to buttress their international liquidity positions if they are to effectively protect itself from the vagaries of international capital markets. One way might be for regional economies to develop a network of swap arrangements that would provide member countries with extra liquidity in the event of a crisis. This is in fact the direction in which East Asia appears to be moving.

**Table 1**  
**Social Cost of Excess Reserves, 1999**

Country	Foreign Reserves (million of US dollars) <sup>a</sup>	Reserves in months of imports	“Excess Reserves” (percent of GDP) <sup>b</sup>	Annual Cost of Excess Reserves (percent of GDP) <sup>c</sup>
Indonesia	26445	7.6	11	<b>0.66</b>
Malaysia	30588.2	4.8	15	<b>0.90</b>
Philippines	13299.7	4.3	5	<b>0.30</b>
Thailand	34062.8	7.3	16	<b>0.96</b>
South Korea	73987.3	5.9	9	<b>0.54</b>

Notes: a) Total reserves minus gold at the end of 1999

b) “Excess” refers to the level beyond the 3-month benchmark

c) Assuming a 6 percent spread between the yield on foreign reserves and the marginal cost of borrowing

Source: Computed from International Financial Statistics, IMF

**Table 2: Estimated Adequate and Actual Reserves**  
(end 1999, billions of US dollars)

<u>Independent Float</u>	<u>BHK measure</u> <sup>a</sup>	<u>Augmented STED</u> <u>Measure</u> <sup>b</sup>	<u>Actual reserves</u>
Brazil	47.4-53.0	43.2	34.8
Chile	7.7-8.2	7.4	14.4
Colombia	6.3-6.8	5.9	7.6
India	14.9-19.8	10.3	32.7
Indonesia	24.2-27.4	21.6	26.4
Korea	51.0-56.2	47.1	74.0
Mexico	29.9-33.1	27.5	31.8
Peru	7.1-7.5	6.8	8.7
Philippines	10.0-11.0	9.4	13.2
Poland	8.9-10.0	8.0	24.5
Russian Federation	13.5-15.0	12.5	8.5
South Africa	16.6-18.6	15.3	6.4
Thailand	19.2-21.9	17.1	34.1
<u>Managed Float or Fixed</u>			
China	86.9-149.8	24.8	157.7
Czech Republic	6.9-8.2	5.9	12.8
Hungary	8.0-8.9	7.3	11.0
Malaysia	12.1-15.1	9.4	30.6
Turkey	29.1-33.3	25.9	23.3
Venezuela	6.2-7.2	5.4	12.3
<u>Currency Boards</u>			
Argentina	45.0-47.5	43.7	26.3
Hong Kong SAR	99.7-105.5	96.1	96.2

Notes: a) This measure is provided by De Beaufort Wijnholds and Kapteyn (2001) where they amalgamate the R/STED ratio with a reserves-to-broad money ratio adjusted to reflect the fraction presented as a range of M2 which may realistically be expected to be mobilised against reserves in a short time span. They also make an allowance for the fact that “not all emerging market economies are equally susceptible to the risk of capital flight”. To make the adjustment they use *The Economist’s* country risk index which takes into account 77 different indicators ranging from monetary and fiscal policy to political stability. The fraction of broad money multiplied by the country risk index is then added to the amount of STED.

b) This measure simply augments STED in the way described in the text of the paper by adding a “policy change” cushion of 3 per cent of short-term external debt.

Source: Modified from Table 3 in De Beaufort Wijnholds and Kapteyn (2001). All data is from International Financial Statistics for reserves and from BIS/IMF/OEDC/World Bank Statistics for external debt. The exchange rate classification is based on the IMF’s Annual Report on Exchange Arrangements and Exchange Restrictions (2000). Reserves have been calculated to exclude gold.