"How should emerging economies manage their foreign exchange reserves?"

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Abstract

Asia has emerged as the balancing wheel of global finance. The countries of Asia now account for 70 per cent of global foreign exchange reserves, compared to only 30 per cent in 1990 and 21 per cent in the early 1970s. This paper explores theoretical interpretations for the relatively high demand for international reserves by developing countries especially in the Far East. This paper provides calculations of the minimal necessary level of international reserves based on benchmarks proposed by Wijnholds and Kapteyn, as well as a discussion of costs of reserves' holding. It therefore provides empirical proof that exchange reserve levels for many of the developing countries have far exceeded the desirable levels. Paper then discusses the steps that central banks in these developing countries can take for an effective reserve management.

Introduction

Foreign exchange reserves of most emerging economies of the world have grown many times over during the last few years. Many of the East Asian countries had small reserves following the 1997 financial debacle arising out of the sudden flight of foreign capital from there. For example, South Korea, had only $4 billion by the end of 1997, but has now $138 billion. Similar is the case with many other South East Asian emerging economies. Countries have been accumulating reserves well beyond levels that would be deemed adequate by the simple import-based yardstick. In what became known as the "Mrs. Machlup's Wardrobe Theory of International Reserves", Mrs. 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. He argued that monetary authorities essentially looked to maximize their reserves. As such, the demand for reserves in any period could, according to Mr. Malchup, be characterized 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.

The rest of the paper is organized as follows. Section 2 describes recent trends in reserve holdings by developing countries and demonstrates that the emerging markets of the Far East are outliers in terms of their sizeable reserve holdings. It also discusses some theories that enhance our understanding of why emerging markets may want to hold large precautionary reserve balances in the aftermath of financial crisis of '97-'98. Section 3 discusses empirical means of computing an adequate level of reserve for developing countries and shows that most of the developing countries are well past the optimal level. In Section 4 we explore the costs associated with supporting a large reserve level and what can central banks do in order to ride over this crisis of excess. Section 5 presents some concluding thoughts.

Factors leading to Reserve Accumulations

Broadly speaking the economic factors that influence forex reserve build up can be summarized as the following:

• *Economic size.* To the extent that international transactions increase with economic size, reserves are expected to rise with population and real GDP per capita.

• *Current account vulnerability.* A more open economy is more vulnerable to external shocks, so greater trade openness would be associated with higher reserve holdings. Also, larger the external shocks (say export volatility), higher the level of reserves.

• *Capital account vulnerability.* As with the current account, greater financial openness could be associated with higher crisis vulnerability and thus influence the

demand for reserves. In addition, greater the potential for resident based capital flight from the domestic currency, higher is the level of reserves.

• *Exchange rate flexibility.* Greater flexibility reduces the demand for reserves, because central banks no longer need a large stockpile of reserves to manage a pegged exchange rate. However, many countries that have adopted more flexible exchange rate regimes (including managed floats) appear reluctant to allow much actual variability. Consequently, it is important to focus on the actual behavior of exchange rates, which suggests that there has in fact been some increase in exchange rate flexibility in recent years, especially in several emerging Asian economies

• *Opportunity cost.* The opportunity cost of holding reserves is the difference between the yield on reserves and the marginal productivity of an alternative investment. The greater the opportunity cost, the lower the level of reserves. With industrial country interest rates hitting 40–50 year lows in many countries, the cost of holding foreign exchange reserves has likely increased for many emerging economies over the past three years.

Ken Rogoff, former chief economist at IMF, had said: "It is one thing to save for a rainy day, but one trillion dollars in reserve accumulation is more like building Noah's Ark." Asian Countries stung by the experience of the Asian Crisis in '97-98 and the resulting heightened awareness of their vulnerability, decided to provide themselves substantial cushion against any future eventuality. In case of countries which have large overseas working population like India, Pakistan, Philippines, homeward remittances have increased steeply after 9/11. Moreover the world economy is on a revival track and this has led to huge export earnings for a majority of emerging economies, adding to the forex reserves. An upward movement in the stock markets in major emerging economies has also contributed by increasing the capital inflows from FIIs. Another factor leading to the high reserves is China's low-wage competitiveness which seriously threatens the export prospects of many Asian nations, including India. Estimates of the extent of under-valuation of Chinese renminbi range from 25% to 50%. Under such a scenario, it becomes crucial for the central banks to prevent appreciation of the domestic currencies in order to prevent or delay erosion of their export competitiveness. Thus market intervention in form of purchase of US dollars further leads to reserve accumulation among these countries. In case of India, NRIs, with a view to taking advantage of the interest rate differential between the dollar and the rupee, are increasing their remittances in India. US deposit rates are at 1.5%, while Indian deposit rates are at around 6.0%. This provides a differential of 4.5%. Factoring in an expected depreciation of 2% in the rupee versus the dollar during the year, NRI deposits still earn a healthy 2.5% compared with what they get in the US markets. Also, foreign investors are putting more money into India as they seek to profit from its relatively high bond yields. Indian bonds have always offered attractive yields compared to more developed countries, but exchange rate

losses caused by a depreciating rupee in the past had discouraged foreign funds. Now, since the rupee is appreciating against the dollar, foreign investors are finding it attractive to increase their investments in India.

Identifying an optimal Reserve Level

Literature on international reserves provides several criteria of their adequacy, including comparisons of reserves with monetary aggregates, imports, and debt. Almost all of them apart from ratio of reserves to short term debt have been marginalized for use in specific cases. The imports criterion (ratio of reserves to imports) is especially important for countries with rather limited access to international financial resources. For instance, Wijnholds and Kapteyn (2001) propose to apply import-based measure of reserves adequacy to low-income developing countries, where involvement into international capital flows is fairly low. The ratio of reserves to monetary aggregates can be useful as an indicator of the potential impact of capital flight, especially in countries with weak banking systems, but needs to be supplemented with an analysis of other possible sources of capital flight (including short-term government liabilities).

One of the most debated issue regarding the import-based reserves adequacy criteria is the benchmark. The rule of thumb, frequently used by the IMF, is three months of imports. There are other possible benchmarks proposed by various researchers like establishing at least 35 percent reserves/import coverage (i.e. 4.2 months of imports). A study conducted by IMF way back in 1958 supported a 30% to 50% reserves/imports ratio, or 4 – 6 months of imports.

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 crisis. Consequently, the reserves-to-short-term external debt ratio has gradually become accepted as an indicator of the threshold at which investors lose confidence, linking the measure to the theory of currency crisis. 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” or Guidotti rule implies that the usable foreign exchange reserves should exceed scheduled amortizations of foreign currency debts in the following year as also such of the liabilities, as could be foreseen.

In 2001, Wijnholds and Kapteyn proposed a new criterion of international reserves’ adequacy for emerging countries that could be considered as an extension of money-

based and debt-based criteria, hereinafter referred as WK criterion. It consists of foll. three components: short-term debt by remaining maturity, fraction of M2 considered as an indicator of potential for capital flight in the country and capital flight probability indicator. It aims to capture two important risk factors, namely an "external drain" (as measured by debt based measures) and "internal drain", or capital flight by residents.

Table 1 provides computation of the 'Adequate Reserve Level' for a number of developing countries and compares it with the actual reserves. For countries with a managed float or fixed regime the fraction of M2 was taken between 10 and 20 percent whereas for floating exchange rate regime and currency, share was taken to be between 5 and 10 percent. To measure capital flight probability indicator, we made use of *Economist*'s country risk index which takes into account 77 different indicators ranging from monetary and fiscal policy to political stability.

Results obtained extend credence to the belief that majority of the countries have grossly inflated reserve levels. India for instance needs around $17B - $25B of foreign exchange reserves whereas it had approximately $82B in reserves as of July 2003.

Besides, W-C criterion, several other models for arriving at an optimal level of reserves has been discussed in research papers. For instance, Frenkel-Jovanovic derive the optimal reserve holdings to be as follows:

$$R0 = (cs/r^{0.5})^{1/2} \quad (1)$$

Where R0 = desired reserves, c = country-specific nominal constant; s = standard deviation of reserve movements; and r = opportunity cost of holding reserves. It reveals desired reserve holdings to be a positive function of volatility and a negative function of the opportunity costs of maintaining reserves.

Aizenman and Marion (2003) have recently estimated the following generalized reserve equation using a panel of 122 developing countries over the period 1980-96:

$$\ln(Rit/Pit) = a0 + a1\ln(popit) + a2\ln(gpcit) + a3\ln(exait) + a4\ln(imyit) + a5\ln(neerit) + et \quad (2)$$

where: *R* is actual holdings of reserves minus gold (millions of US dollars deflated by the US GDP deflator, *P*); *pop* is the total population of the country; *gpc* is real GDP per capita; *exa* is the volatility of real export receipts; *imy* is the share of imports of goods and services in GDP; and *neer* is the volatility of the nominal effective exchange rate.

Results obtained using W-K Criterion can be verified using these other approaches and current values for the different variable but that work has been left for future study.

Opportunity Cost of maintaining high Reserve levels

The practice of accumulation of foreign exchange reserves, which is the main part of the Asian exchange rate management, is not costless. While adequate foreign exchange reserves are needed, they do come at a cost. Reserves held in U.S. Treasuries, for example, earn a modest return, far below these countries' own cost of borrowing either in local currency or in dollars. Yield on reserves is much lower than the potential return they could earn by using those reserves to make real investments in the economy, such as building roads, bridges, and schools. The World Bank, in its latest report, *Global Development Finance, 2003*, has said that foreign exchange reserves in most developing countries have gone up much above the widely used benchmarks and carry a significant carrying cost. The report says that $ 110 billion was added to the official reserves of developing countries in 2002, the highest-ever in recent years. Interestingly, India alone added $ 21 billion to its reserves during the year. High external reserve holdings come with a significant carrying cost in terms of interest rates. Most countries invest their foreign exchange reserves in relatively safe, short-term assets, such as US treasury bills. The yield on a 10-year US treasury bill is at 4.16% - well below the interest rates that developing countries pay on their external debt.

The rate of return on the investments of foreign exchange reserves is much lower than what the economies can obtain by investing their resources in their own industries and infrastructure. This quasi-fiscal cost of managing large foreign exchange reserves is, indeed, too high for the Asian economies.

Ideally, the opportunity cost should be measured as the difference between the highest possible marginal productivity forgone from an alternative investment in fixed assets and the yield on international reserves. However, it is not possible to obtain such a measure for a large sample of developing countries. A less satisfactory but standard way of computing the opportunity cost is by taking differential between the country's own-interest rate and the interest rate on U.S. Treasuries, and multiplying it by the excess reserve level. Table 2 provides this data where Excess reserve has bee taken as the difference between Actual reserves and level of reserves computed using W-K criterion. For India, annual opportunity cost of maintaining excess reserves comes out to be around .7% of GDP.

Management of excess Reserves

It's well known that the most immediate aspect of crisis response, and its successful management, is access to short-term hard currency to ward off the liquidity scarcity that follows as investors panic and flee the domestic capital market. . Underlying this reserve accumulation strategy is the assumption that when a crisis occurs, access to the private international capital market is uncertain and an International Monetary Fund bailout may also not be immediately forthcoming. Further, the IMF bailout is a subset of the prevailing international political economy, which may or may not be to a national government's advantage. The crisis-bitten, wiser-by-experience East Asian economies have examined and are trying to find a solution through creating a regional network of bilateral currency swaps and repurchase agreements. Recall the post-Bretton Woods period when the industrialized countries established a network of bilateral swap arrangements amongst themselves as a source of liquidity to sustain their exchange rate pegs. The East Asian initiative, called the Chiang-Mai initiative, is a regional set-up that intends to be an immediate and unconditional credit line to its members in the event of a crisis, though finer contours are still being thrashed out. Being a regional arrangement (Asean countries and China, Korea and Japan), it represents an Asian perspective that not only corresponds to the observed regional nature of crisis contagion but a broadly common placement in the international political economy. . A desirable difference between this arrangement and the IMF credit facility is that a mutual currency swap can be reversed after the storm has passed. In 1999 the IMF has also introduced a new instrument, namely Contingent Credit Lines, to protect countries from contagion effect providing extra liquidity (Bussiere and Mulder, 1999). This instrument may enhance the access to international funding in the future.

Conclusion

The emerging economies can use there excess reserves to spur growth and productivity in their countries. These economies can facilitate the import of technology and Capital Goods and thus scale up productivity using these reserves. The release of foreign exchange for purchase of foreign goods and services like travel, medical needs, educations etc by domestic residents can be liberalized. Allowing domestic companies to acquire foreign corporations and removal of caps on foreign payments like royalty, technology transfer fees etc. will also ease the pressure of excess reserves at the same time increasing productivity of the economy. The excess reserves should also be used to prepay foreign debts so as to reduce the debt servicing obligation on the economy.

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Independent Float	Imports (Mil US $)	M2 (billion native currency)	STED	M2 (billion US$)	Fraction of M2		Country Risk Index	Adequate Reserves		Actual Reserves (millions US $)	Exchange Rate(as of 30th Oct 2003)
					minimum	maximum		minimum	maximum		
Brazil	49,251	527	36,662	184.932	9.2465874	18.493175	52	41.470225	46.278451	47488	2.8497
Chile	17,306	21527	11,233	33.989	1.6994553	3.3989106	23	11.623875	12.014749	15406.3	633.35
Colombia	12,994	66232	4,021	23.003	1.1501407	2.3002813	53	4.6305745	5.2401491	10338	2879.3
India	**64,100**	**18091**	**9,245**	**399.360**	**19.967991**	**39.935982**	**41**	**17.431876**	**25.618753**	**81920**	**45.3**
Indonesia	37,384	933676	14,904	109.818	5.4909198	10.98184	62	18.30837	21.712741	32990	8,502.00
Korea	170,303	591552	47,288	502.307	25.115355	50.23071	27	54.069146	60.850292	132831	1,177.67
Mexico	175,684	1394	31,674	126.075	6.303756	12.607512	47	34.636765	37.599531	54135	11.0569
Peru	8,161	0.071	6,648	0.020	0.0010222	0.0020444	52	6.6485315	6.6490631	9665.1	3.4729
Philippines	38,222	2299	8,762	41.554	2.0777225	4.1554451	52	9.8424157	10.922831	12984	55.325
Poland	50,936	336	13,260	83.253	4.1626403	8.3252806	39	14.88343	16.506859	30849.1	4.0359
Russian Federation	74,839	3631	19,655	121.114	6.0557038	12.111408	51	22.743409	25.831818	60709.9	29.98
South Africa	28,748	722	10,894	104.408	5.2203841	10.440768	44	13.190969	15.487938	6430	6.9152
Thailand	63,107	5531	11,593	138.509	6.925454	13.850908	41	14.432436	17.271872	36655	39.9324
Managed Float or Fixed											
China	383,410	22765	38,071	2750.526	275.05256	550.10512	42	153.59307	269.11515	361340	8.2766
Czech Republic	47,645	1781	5,643	64.644	6.4643986	12.928797	35	7.9055395	10.168079	25032	27.5509
Hungary	45,281	8894	11,365	40.295	4.0295397	8.0590794	37	12.85593	14.346859	12181	220.72
Malaysia	79,357	390	9,550	102.618	10.261808	20.523615	35	13.141633	16.733265	37815	3.8005
Turkey	63,888	195084917	25,226	130.536	13.053576	26.107153	61	33.188682	41.151363	29097	#########
Venezuela	11,733	23812	4,520	14.892	1.4891807	2.9783615	68	5.5326429	6.5452858	12828	1,599.00
Currency Boards											
Argentina	13,586	129	25,937	45.010	2.2505234	4.5010468	79	27.714913	29.492827	13484	2.866
Hong Kong, China	225,448	3015	57,448	388.145	19.407264	38.814528	22	61.717598	65.987196	112570	7.76771

STED	End of Period June 2003 (figures in Millions of Dollars)
	Short Term External Debt
Imports	Imports of goods, free-on-board (fob) basis - International Financial Statistics
Country Ris	Overall risk assessment of the political and macroeconomic environment within the country.
	Source: EIU Country Risk Service
M2	Sumof M1 Money Supply (line 34 in IFS) and Quasi Money Supply (line 35 in IFS)
Actual Rese	non gold reserves as of end of poeriod July 2003

As per W-K Criterion, South Africa, Hungary, Turkey and Argentina have less than adequate level of reserves while most of the countries seem to have much more than the optimal level of reserve.

Opportunity Cost of Holding excess Reserves

Excess Reserves Obtained as diff. between actual reserves and Adequate Reserves
We treat these "excess" levels of reserves as the opportunity cost of maintaining an open capital account.
South Africa, Hungary, Turkey and Argentina are not considered as they
have less than adequate level of Reserves
Opportunity Cost = (inti - int_{USA})*ER(i)
int_{USA} 1.1
Country(Arranged by Exchange Regime)

Independent Float	inti	interest rate differential	Excess Reserve (US $ bil)	Annual Opportunity Cost of Excess Reserves	Nominal GDP (billions of local currency)	Nominal GDP(in billion US $)	Annual Opportunity Cost of Excess Reserves (in % of GDP)
Brazil	23.8	0.227	1.20955	0.27456766	1,526	535.495	0.051%
Chile	2.9	0.018	3.39155	0.06104791	48,191	76.0891	0.080%
Colombia	7.9	0.068	5.09785	0.34665386	225,676	78.3788	0.442%
India	**8.5**	**0.074**	**56.3012**	**4.1662923**	**26,634**	**587.947**	**0.709%**
Indonesia	13.3	0.122	11.2773	1.37582566	1,854,668	218.145	0.631%
Korea	5	0.039	71.9807	2.80724763	614,994	522.213	0.538%
Mexico	3.4	0.023	16.5355	0.38031579	6,495	587.416	0.065%
Peru	5	0.039	3.01604	0.11762544	215	61.9079	0.190%
Philippines	5.4	0.043	2.06117	0.08863025	4,109	74.2702	0.119%
Poland	4.9	0.038	14.3422	0.54500514	804	199.212	0.274%
Russian Federation	4	0.029	34.8781	1.01146438	12,803	427.051	0.237%
Thailand	1.4	0.003	19.3831	0.05814938	5,444	136.33	0.043%
Managed Float or Fixed							
China	2	0.009	92.2249	0.83002366	11,337	1369.77	0.061%
Czech Republic	2.3	0.012	14.8639	0.17836705	2,304	83.627	0.213%
Malaysia	3.1	0.02	21.0817	0.42163469	378	99.4606	0.424%
Venezuela	23	0.219	6.28271	1.37591441	124,906	78.1151	1.761%
Currency Boards							
Hong Kong, China	0.1	-0.01	46.5828	-0.465828	1,250	160.96	-0.289%

int^i Deposit interest rate (%)
The average rate given by banks on certificates of deposit of 30 days or longer. Line 60l in IFS.