Appendix 3

The Adequacy of Foreign Exchange Reserves

While many economies struggle to maintain adequate reserve levels, a growing number of countries have accumulated vast stocks of reserves; in some cases the reserve stocks are so large as to bring into question their necessity.[1]

The most common motivation for holding large reserves is to insure against currency crises by enabling authorities to support their own currency. Figure 1 shows that seven of the top ten reserve holders are countries typically considered emerging economies.

Other reasons to hold reserves will not likely require similarly large amounts. The act of acquiring reserves may serve an immediate purpose, such as fighting deflation. Once acquired, however, large reserve stockpiles serve little purpose other than to serve as a precautionary fund. Indeed, in advanced economies, flexible exchange rates and strong macroeconomic policies have diminished even the precautionary value of reserve holdings.

Figure 1: Top 10 Holders, Total Reserves Minus Gold

	Level	Percent Increase	
	USD bn as of June 2006	from June 2005	from June 2002
China	943.6	32%	283%
Japan	849.8	2%	94%
Taiwan	262.0	3%	77%
Russia	243.2	64%	510%
Korea	225.6	10%	101%
India	156.8	17%	183%
Singapore	127.3	10%	59%
Hong Kong SAR	126.6	4%	13%
Mexico	84.9	29%	86%
Malaysia	78.4	5%	143%

Source: IMF

The emerging market crises of the 1990s resulted in a growing literature on the level of reserves necessary to adequately insure against shocks.[2] In that literature, several basic benchmarks for emerging economies were suggested:

- ***Reserves equal to short-term external debt***: Countries that may be vulnerable to a capital account crisis can benefit from holding reserves sufficient to cover all debt obligations falling due within the coming year. This benchmark, known as the Greenspan-Guidotti rule, is the most widely preferred benchmark for measuring vulnerability to capital account crisis, and its relevance to currency crisis prevention has the strongest empirical support.[3]

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[1] This topic has been analyzed extensively in Green, Russell and Tom Torgerson, 2006, "Are High Foreign Exchange Reserves in Emerging Markets a Blessing or a Burden?" Forthcoming Treasury Department Occasional Paper.

[2] See Wijnholds, J. Onno De Beaufort and Arend Kapteyn, 2001, "Reserve Adequacy In Emerging Market Economies," IMF Working Paper No. 01/143.

[3] See Bussière, Matthieu and Christian Mulder, 1999, "External Vulnerability in Emerging Market Economies: How High Liquidity Can Offset Weak Fundamentals and the Effects of Contagion," IMF Working Paper No. WP/99/88; García, Pablo and Claudio Soto, 2004, "Large Hoardings of International Reserves: Are They Worth It?" Central Bank of Chile Working Papers No. 299; and Jeanne, Olivier and Romain Rancière, 2005 "The Optimal Level of International Reserves for Emerging Market Economies: Formulas and Applications," IMF Working Paper No. WP/06/229.

- ***Reserves equal to roughly 5-20 percent of M2***: Economies that need to shore up confidence in the value of local currency and reduce the risk of capital flight may find this benchmark useful. Less flexible exchange rates necessitate higher reserves relative to M2.

- ***Reserves equal to three or four months of imports***: This benchmark is especially relevant to low-income countries exposed to current account shocks and without significant access to capital markets.

The emerging economies among the top ten reserve holders maintain reserves far in excess of nearly all of the benchmarks, as shown in Figure 2. Some have attempted more sophisticated calculations to empirically estimate optimal reserve demand by taking into account the fact that different economies have different degrees of exposure to different risks.[4] All of the top reserve holders studied were found to have actual holdings in significant excess of predicted levels.

Figure 2: Emerging Market Adequacy Reserve Ratios, 2005

	reserves/short-term debt	reserves/M2	reserves/months of imports
China	11.58	0.22	15.72
Taiwan	5.95	0.35	15.65
South Korea	2.63	0.21	7.93
Russia	4.43	0.93	16.40
India	4.29	0.80	13.17
Mexico	2.71	0.18	3.78
Malaysia	3.09	0.43	7.49
benchmark	**1.00**	**0.05 - 0.20**	**3.00**

Source: IMF, BIS, and national sources.

Holding reserves beyond the recommended benchmarks will, other things equal, probably reduce an economy's vulnerability to financial crisis. But it will do so with diminishing marginal benefit and rising marginal costs. Though difficult to quantify, the costs associated with holding reserves include:

- Sterilization costs: Sterilization neutralizes the inflationary monetary impact of reserve accumulation, typically by domestic debt issuance to offset the associated increase in money supply. If the interest rate for domestic borrowing exceeds the interest rate on reserves, the direct fiscal costs may be significant. In addition, the economy may incur indirect systemic costs because sterilization allows a central bank to influence the real exchange rate and hence disrupt appropriate current account adjustment.

- Opportunity costs: Alternative uses for foreign exchange reserves may yield greater returns – examples include prepaying external debt and undertaking public investment projects.[5]   If reserves exceeding the level or ratio indicated by adequacy benchmarks

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[4] See Aizenman, Joshua and Nancy Marion, 2003, "The High Demand for International Reserves in the Far East: What Is Going On?" Journal of the Japanese and International Economies, 17(3):370-400; Edison, Hali, 2003, "Are Foreign Reserves Too High?" World Economic Outlook, IMF, September; and Gosselin, Marc-André and Nicolas Parent, 2005, "An Empirical Analysis of Foreign Exchange Reserves in Emerging Asia," Bank of Canada Working Papers No. 05-38.
[5] This idea has been recently discussed by Genberg, Hans, Robert McCauley, Yung Chul Park and Avinash Persaud, 2005, "Official Reserves and Currency Management in Asia: Myth, Reality and the Future," Geneva Reports on the World Economy 7, Centre for Economic Policy Research;

were put to alternative uses with returns only three percent higher than current risk-free reserve assets, benefits could be as much as one percent of GDP each year.

- Balance sheet risks: If the local currency appreciates, the local value of international reserves decreases. Although some monetary authorities may average these losses out over time, other central banks may realize significant balance sheet losses. Even if the central bank is able to recapitalize from retained profits and is not directly affected by losses, those retained profits represent revenue forgone by the treasury. Reserves in most of these countries are several times central bank capital and more than ten percent of GDP, so the magnitudes of potential losses are significant.

- Other costs: If reserves create a false sense of security, the incentive to tackle difficult reforms may be reduced. Rapid reserve accumulation may also complicate the formulation of monetary policy under flexible exchange rates.

In light of the potential cost of holding reserves, in situations where reserves far exceed commonly accepted adequacy levels, questions can arise about the necessity and wisdom of adding further reserves to existing stocks.

Summers, Lawrence H., 2006, "Reflections on Global Account Imbalances and Emerging Markets Reserve Accumulation," L.K. Jha Memorial Lecture, Reserve Bank of India, Mumbai, India; and
Rodrik, Dani, 2006, "The Social Cost of Foreign Exchange Reserves," International Economic Journal, forthcoming.