

The Case for an International Reserve Diversification Standard

Edwin M. Truman and Anna Wong

Abstract: Rumors about the actual or potential currency diversification of countries' foreign exchange holdings out of dollars are not a new phenomenon. This working paper argues that such concerns about reserve diversification are exaggerated. We present evidence that the extent of actual diversification has been modest to date. Nevertheless, the potential for reserve diversification adds volatility to foreign exchange markets and can catalyze abrupt exchange rate movements. We argue that policymakers acting in their own national interests can do something constructive to reduce the volatility introduced into foreign exchange and financial markets by rumors of large-scale international foreign exchange reserve diversification. We propose the voluntary adoption by major foreign exchange reserve holders in particular of an International Reserve Diversification Standard consisting of two elements: (1) routine disclosure of the currency composition of official foreign exchange holdings and (2) a commitment by each adherent to adjust gradually the actual currency composition of its reserves to any new benchmark for those holdings.

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Edwin M. Truman, senior fellow since 2001, was assistant secretary of the Treasury for international affairs (1998–2000). He directed the Division of International Finance of the Board of Governors of the Federal Reserve System from 1977 to 1998. From 1983 to 1998, he was one of three economists on the staff of the Federal Open Market Committee. He is the author of *A Strategy for IMF Reform* (2006) and *Inflation Targeting in the World Economy* (2003), editor of *Reforming the IMF for the 21st Century* (2006), and coauthor of *Chasing Dirty Money: The Fight Against Money Laundering* (2004). **Anna Wong** is a research assistant at the Institute.

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On Friday February 18, 2005, a rumor began to circulate in global foreign exchange markets that the Korean authorities had prepared a report about their plans to diversify the currency composition of Korea's \$200 billion in foreign exchange reserves. By the following Tuesday, the won had appreciated against the dollar by 2 percent against a background of clarifications, some of which read more like obfuscations, issued by various Korean authorities. Officials in other jurisdictions, such as Taiwan and Singapore, also issued statements denying that they had been diversifying, or planned to diversify, their foreign exchange holdings.¹ Because the Korean and other authorities presumably would diversify out of US dollar assets and into euro- and yen-denominated assets, the movement of the dollar against the euro and yen was more interesting than the movement of the won-dollar rate: Over three business days February 18 to 22, the dollar depreciated 1 percent against the euro and 1.2 percent against the yen—substantial but not huge adjustments.

Rumors about actual or potential diversification of official foreign exchange holdings away from the US dollar are not a new phenomenon. During periods of significant dollar depreciation, of which there have been five over the past 30-plus years of generalized floating of the major currencies, such rumors have been frequent catalysts of abrupt exchange rate movements. Concerns about reserve diversification have intensified with the advent of the euro, and the subsequent greater liquidity of euro-area financial instruments, as a credible rival to the US dollar, as well as with the nascent development of a domestic-currency Asian bond fund as an alternative to traditional instruments in which to invest Asian countries' foreign exchange reserves.

We argue that policymakers acting in their own national interests can do something constructive to reduce the volatility introduced into foreign exchange and financial markets by rumors of large-scale international foreign exchange reserve diversification while at the same time maintaining, and arguably enhancing, their flexibility to modify the currency composition of their reserves. We propose the voluntary adoption in particular by the major foreign exchange reserve holders of an International Reserve Diversification Standard consisting of two elements: (1) routine disclosure of the currency composition of official foreign exchange holdings and (2) a commitment by each adherent to adjust gradually the actual currency composition of its reserves to any new benchmark for those holdings. We envisage that this standard would be incorporated into the Special Data Dissemination Standard (SDDS) of the International Monetary Fund (IMF) and that the IMF would monitor compliance of participants with the standard.

In the next two sections, we explain why concerns about the direct effects of official reserve diversification on financial markets, while potentially significant, are most likely exaggerated. We argue

1. "Dollar Declines as Bank of Korea Plans to Diversify Reserves," Bloomberg.com, February 22, 2005; "Dollar Rises as Japan, Korea Say They Won't Sell the Currency," Bloomberg.com, February 23, 2005.

that the United States is less dependent on foreign official inflows as the counterpart of its current account deficits than some observers claim, suggesting less of a potential adverse effect from official diversification out of dollars on dollar-based financial markets. We also argue that there is appropriately and understandably substantial caution and inertia in reserve management practices.

Furthermore, an examination of publicly available information suggests that to date the extent of reserve diversification has been limited. We report that the average absolute change in the dollar's share of reported aggregate reserves over the past 25 years has been 2.2 percentage points in quantity terms, and the *average* absolute change over the past five years has been substantially smaller than that figure although in 2005 the *actual* change was a decline of 2.5 percentage points. A 2.2 percentage point change in estimated official foreign exchange reserve holdings of dollars as of the end of 2005 translates into \$92 billion—0.21 percent of total cross-border financial liabilities, excluding foreign direct investment and US liabilities, of \$43 trillion. A smooth adjustment of that size amounts to only \$367 million per trading day on average compared with about \$2 trillion a day in turnover in global foreign exchange markets.

Nevertheless, countries do and should be able to change the currency composition of their foreign exchange holdings, and reports on their actual or rumored activities can have pronounced effects on market psychology and behavior. Therefore, a cooperative effort by national monetary authorities to minimize the market effects of rumors and changes in policies about reserve diversification, building on previous efforts to increase the transparency and accountability of official policies in this area, would be desirable. Consequently, in the final section, we elaborate our two-part proposal for an International Reserve Diversification Standard.

CONCERNS ABOUT RESERVE DIVERSIFICATION ARE EXAGGERATED

The principal reason why policymakers and participants in financial markets are interested in reserve diversification is out of a concern that substantial changes in the currency composition of reserves of the major holders will trigger violent exchange market adjustments, which, in turn, can have major knock-on effects on other financial markets with possible additional macroeconomic effects. Participants in financial markets also have short-run profit motives. If there is a major trend toward diversification of reserves away from dollar holdings (or in favor of dollar holdings, for that matter), they want to be ahead of the pack of official investors rather than bringing up the rear. However, only a small number of countries have foreign exchange holdings that are sufficiently large that their substantial diversification at a rate of \$10 billion a month (\$500 million a day), for example, would have pronounced exchange market effects.

Our principal purpose is not to explore in detail why rumors of the diversification of foreign exchange holdings may affect exchange markets, but among the possible reasons are the following: First,

market participants may think that the authorities of the diversifying country know something or are signaling a major change in policies about which they have inside information. (In fact the market participants themselves may have access to inside information.) Alternatively, market participants may see official reserves as a fundamental source of “real demand” for various types of foreign exchange assets, in particular their willingness to continue to accumulate US dollar-denominated assets. Second, market participants may be concerned that the actions by the authorities will set off an avalanche by removing a principal support for the US dollar in the context of a perceived overhang or excess supply of dollar-denominated assets in official hands. They may want to get out of the way or out in front of that avalanche, which would tend to magnify the effects of the diversification itself. Third, even if there is no avalanche, if the adjustments in the currency composition of reserve holdings are not smooth, they could have short-run market effects even if the longer-run effects are minimal.

Papaioannou, Portes, and Siourounis (2006) represent informed official, academic, and market opinion on this topic. They state (2006, 2), “Decisions by even a handful of central banks to shift their reserve composition away from the dollar could result in sizable dollar depreciation.” They observe that academics and money managers actively urge countries to diversify their rapidly growing reserve holdings, argue that the emergence of the euro offers new opportunities, along with the liquidity in other nondollar asset classes, and warn (2006, 17), “Portfolio rebalancing away from the dollar would have immediate implications for the US and the global economy.” Their exercise is technical and does not point to an immediate or rapid increase in diversification away from the US dollar.² However, it suggests by illustration a basis for examining reserve diversification as well as support for our proposed International Reserve Diversification Standard to help manage the process in an orderly manner and to minimize adverse effects on the global financial system and economy.

Some Preliminary Considerations

The data presented in table 1 demonstrate that as of the end of 2005 only eight countries had foreign exchange holdings of more than \$100 billion. Those countries held \$2.7 trillion in foreign exchange reserves or almost two-thirds of the global total. Moreover, only 25 countries, plus the European Central Bank, had foreign exchange holdings of more than \$30 billion.³ The top eight of those countries

2. According to their calculations, the euro’s share may already be larger than is currently justified by their optimization framework. Curiously, the authors interpret this finding as foreshadowing an enhanced future global role for the euro.

3. The combined foreign exchange holdings of the United States, Japan, and euro area were \$1.1 trillion at the end of 2005 or 26 percent of the global holdings and 84 percent of the holdings of industrial countries. As the issuers of the three principal international currencies, each of them is limited in the extent to which they can diversify their own foreign exchange holdings.

accounted for 75 percent of the increase in foreign exchange reserves over the previous four years of general dollar weakness. For 21 of the countries listed in table 1, holdings of foreign exchange reserves were at least 10 percent of GDP.

It is useful to recall the several motives policymakers may have to accumulate foreign exchange reserves: (1) They may need to accumulate balances for transaction purposes such as to cover purchases of goods and services or to service debt coming due if there is a temporary shortfall in export earnings or temporary closing of access to international capital markets. (2) They may want to accumulate a stock of foreign exchange holdings beyond that point as insurance against sudden stops (or reversals) of capital inflows.⁴ (3) They may want to resist appreciation of their exchange rates in order to sustain the rapid growth of their exports.⁵ (4) Finally, they may have a view about the optimal allocation of the government's financial investments.

The first three motives for accumulating foreign exchange reserves are intimately linked to the official intervention operations in foreign exchange markets. Along with foreign-currency repayments and borrowings, they are the flows through which countries deplete or add to their stocks of foreign exchange. Consequently, other than at the conceptual level, it is difficult to differentiate between foreign exchange market intervention and diversification of foreign exchange holdings. As we will see below, and is discussed in more detail by Wong (2006), it would appear that in the aggregate, countries buy or sell foreign exchange, adding to or subtracting from their foreign exchange holdings in their intervention currency, and only subsequently rebalance the currency composition of their portfolios.

It is important to understand, however, that once a government deliberately or as a by-product of another policy has accumulated the foreign exchange, its options are limited. It can use the foreign exchange to repay external debt or it can gradually sell the foreign exchange into the market for domestic currency or wait until its own currency is under pressure and do so, but aside from those adjustments the government has become a foreign investor. It is inappropriate to view those investments or the return on those investments as if they were made in the domestic market in domestic currency because that is no

4. See Calvo (1998) and the literature his seminal article has spawned. This motive has recently been associated with self-insurance (BIS 2005b, chapter 3; Aizenman and Lee 2005). However, reserve accumulation may also be associated with a more positive objective; for example, Sidaoui (2003) describes the Mexican motivation to continue to accumulate international reserves, after an initial rebuilding in the wake of the 1994–95 crisis, in terms of sending a signal to the credit rating agencies in an effort (successful) to improve Mexico's credit rating and lower its external borrowing costs.

5. A subcategory of this third motive is reserve accumulation associated with a temporary surge in export earnings that is not expected to be sustained, for example, in connection with a sharp rise in oil prices. Where the rise in export earnings is expected to be sustained, the authorities' reserve accumulation may be explained by a long-term optimal investment motive—the fourth motivation listed—as well as the second motivation—preventing real appreciation and the associated infection with Dutch disease.

longer a realistic option.⁶ If the domestic currency appreciates against all foreign currencies, the value of the government's foreign investments will decline. This may be one reason why the government resists currency appreciation. However, it is not the most appropriate way for the government to think about its investment decisions. Given its stock of foreign-currency reserves, the government's investment decision is designed to ensure the liquidity of, to protect the safety of, and within those constraints to maximize the return on those investments, including how those returns may be affected by movements in exchange rates among foreign currencies.⁷

With respect to the fourth motive, allocation of a country's foreign official investments, another set of considerations arises: distinguishing between a country's official holdings of foreign exchange reserves and any investment fund that has been set up to manage the government's longer-term investments abroad. Those funds may be set up for a number of purposes. For example, Singapore's Temasek Holding and the Government of Singapore Investment Corporation (GIC) are viewed as devices to diversify Singapore's international investments and provide resources to finance pension and other benefits.⁸ Norway's Pension Fund, formerly called the Government Petroleum Fund, and the related Government Petroleum Insurance Fund were created to transform national resources that were once located under the North Sea into resources that can provide income to Norwegians when those energy resources are depleted. In Chile, Russia, and Kuwait, investment funds have been set up primarily to smooth out fluctuations in export earnings and the effects of blunt boom-bust commodity cycles on their domestic economy.⁹

Countries may also choose to devote a certain portion of their reserves to another purpose, such as recapitalizing their government-owned banks, as China recently has done with \$60 billion of its reserves. (Some not unreasonably argue that the Chinese motive was to obscure the build up in China's foreign exchange reserves, but the authorities were transparent about the operation.) Consequently,

6. If the government were able to hedge its foreign exchange holdings, it in effect would be intervening in favor of its own currency.

7. The authorities of a country with a currency that is generally appreciating may be concerned that the income stream from its foreign investments will be reduced by the appreciation. However, against these concerns, most countries retain their earnings on their foreign exchange reserves in their reserves. If this were their concern, they should rebalance their portfolios toward domestic investments by disposing of their earnings.

8. During the 1970s, Singapore's foreign exchange reserves grew rapidly, and the government decided that the national wealth could be better utilized by investing in longer-term and higher-yielding assets. The government subsequently set up two asset management companies to achieve this objective. In 1974 it set up Temasek Holdings, which invests in Singapore as well as abroad, and in 1981 the GIC, which invests exclusively abroad. They focus on long-term investments.

9. Chile's Copper Stabilization Fund (CSF) was established in 1985; Russia's Oil Stabilization Fund was established in 2003; and Kuwait's Fund for Future Generations was established in 1976.

the dividing line between a country's foreign exchange reserves and the government's other foreign investments is somewhat arbitrary. Moreover, the size of a country's investment fund can dwarf its official holdings of foreign exchange reserves.¹⁰

Our focus is on the foreign exchange reserves. On the one hand, we presume that the management of government investment funds tends to be guided by considerations of long-term returns to a substantially greater degree than the management of foreign exchange reserves. The management of investment funds involves longer-term investments and smoother adjustments of portfolios that do not normally introduce added volatility into financial markets—no more than the volatility introduced by the management of private international investment portfolios. On the other hand, from the standpoint of domestic taxpayers, the case for transparency and accountability in the management of such investment funds is similar to the case with respect to foreign exchange holdings.

There is an extensive literature on the demand for international reserves. A representative sample includes Aizenman and Lee (2005); Dooley, Lizondo, and Mathieson (1989); Edwards (1983); Eichengreen and Mathieson (2000); Flood and Marion (2001); and Frenkel (1974 and 1983). This working paper is not the place to review and evaluate this literature. Moreover, in the context of concerns about reserve diversification, the issue of active reserve management primarily comes into play only after a country has accumulated substantial reserves, scaled by the size of the country's economy (see column 4 of table 1) or when the fourth (long-term investment) motive comes into play. At this point, policymakers, responding in some cases to domestic political pressures, begin to think not only about the maturity profile and other risk-return dimensions of their foreign exchange holdings in particular currencies but also about the currency composition of those holdings. In other words, they begin to act more like private-sector international portfolio managers though not exactly like short-run profit maximizers. They are more constrained in their behavior. Their portfolios are already large, and taxpayers expect the authorities to follow relatively conservative investment guidelines even if they do not entirely understand that the option not to invest abroad essentially has been foreclosed. Regardless of the country's political system, issues of transparency and accountability are involved to some degree.

What about possible guidelines (published or unpublished) for the currency composition of reserves? For a country motivated to hold reserves to meet a short-term objective (motive 1) related to trade and finance, the authorities would be expected to hold most of their reserves in their intervention currency, thus minimizing the transaction costs involved in shifting from the intervention currency to

10. In the case of Singapore, its official foreign exchange holdings in 2005 were \$117 billion, while its foreign investments via GIC and Temasek were more than \$160 billion. The respective amounts in reserve and investment accounts in Norway were \$46 billion and \$196 billion in 2005, in Chile \$17 billion and about \$1 billion at the end of 2005, in Russia \$176 billion and about \$55 billion in 2005, and in Kuwait \$8 billion and about \$80 billion in 2004.

another currency and back again. For a country worried about meeting its debt obligations over the medium term (motive 2), the currency composition of its foreign exchange reserves might be more diversified, depending on the currency composition of its debt obligations, which may change over time. Only for a country with a medium- or longer-term investment motive (3 or 4) would one normally expect risk and return considerations to enter heavily into decisions about the currency composition of reserves, in other words, the potential gains from reserve diversification.

What Do We Mean by Reserve Diversification?

Foreign exchange reserve diversification as a phenomenon that affects foreign exchange markets is much misunderstood. Therefore, it is appropriate to define some terms.

Assume at the beginning of a period a country holds SDR100 billion¹¹ in foreign exchange reserves divided in equal proportions between investments denominated in the US dollar, euro, and yen, and assume the country's authorities do not add to the country's foreign exchange holdings over the period. If the dollar depreciates against the euro and yen and, potentially, the country's currency as well, at the end of the period the SDR and domestic-currency value of US dollar holdings would decline, and the SDR and potentially the domestic-currency value of the euro and yen holdings would rise. This is *passive* reserve diversification: The dollar's share in the portfolio declines.¹² By assumption the authorities have taken no action that would have affected the relative supply of dollar and nondollar assets in the hands of the public, and passive diversification should have no effects on dollar-euro or dollar-yen exchange rates.

Alternatively, assume that the country's authorities make no net purchases of foreign exchange in the market over the period, but in response to the dollar's depreciation, actual or expected, they sell some of their dollar holdings and increase their holdings of euro and yen assets. This is *active* reserve diversification. The dollar's share in the country's reserve portfolio declines by more than in the first case, and the authorities' actions selling dollar assets for euro and yen assets might be expected to have accelerated the dollar's depreciation.¹³

11. Special drawing rights (SDR) serve as the unit of account of the IMF. Its value is based on a basket of four principal international currencies: the US dollar, the euro, the yen, and pound sterling.

12. *Passive* reserve diversification may be associated with differences in interest rates on assets denominated in different currencies to the extent that they are not offset by movements in exchange rates. For our illustrative purposes, we can ignore these effects though they may be substantial. For example, the decline in the yen share of international reserves in recent years, discussed below, at least to some extent has been associated with the very low return on yen-denominated financial assets over an extended period.

13. In this analysis, we are assuming that sterilized foreign exchange market intervention has at least some

Finally, assume that the country's authorities think that the dollar's depreciation will be temporary and sell euro and yen assets to buy dollar assets. This tendency toward the maintenance of constant value shares is *stabilizing* reserve diversification, sometimes called portfolio rebalancing. By buying dollars when they are cheaper, the dollar's value share in the portfolio declines by less than in the first case and increases in quantity terms. The authorities' actions would tend to support the dollar and cushion the dollar's decline. In fact the authorities may be buying dollars in the foreign exchange market primarily to limit their own currency's appreciation against the dollar. Whatever their motive, these purchases tend to raise the dollar's share in the country's reserves.

It is important to understand the distinctions between these three types of reserve diversification. We will return to them in the next section.

Why Are Concerns about Active Reserve Diversification Exaggerated?

Concerns about active foreign exchange reserve diversification are exaggerated in three respects: (1) The role of the official sector in providing external finance to the US economy is overstated. (2) Monetary authorities have good reason to be cautious in managing their reserve holdings, and the available statistical and anecdotal evidence suggests considerable inertia in the way countries manage the currency composition of foreign exchange reserves. (3) Aggregate data on the currency composition of reserves do not support the view that active diversification is widespread. This subsection summarizes the first two arguments; the following section examines the aggregate data.

Role of Foreign Official Financing in the US Economy

A nontrivial number of thoughtful economists argue that the US economy is highly dependent upon foreign official financing (for example, Roubini and Setser 2005 and Warnock and Warnock 2005). Truman (2005) argues that these concerns are overstated.¹⁴ It is possible to hypothesize a run away from

temporary influence on exchange rates in the expected direction (dollar sales depress the dollar or slow its appreciation). The profession is divided on this issue. On the side supporting significant effectiveness of intervention are Dominguez (2003), Fratzscher (2004), Ito (2002), Kubelec (2004), and Sarno and Taylor (2001), among others. On the other side are Edison (1993), Ito (2005), Galati and Melick, (2002), and Schwartz (2000), among others. Truman (2003) is skeptical about the lasting effects of sterilized intervention but accepts that often there may be some temporary effects, which is all that really is necessary for those concerned about the financial-market effects of *active* reserve diversification.

14. Bernanke (2006), in part based on Bernanke, Sack, and Reinhart (2004), argues that the impacts of foreign official intervention purchases and sales of US Treasury securities are in the "very short run" and argues against "a dominant influence of foreign official portfolio decisions on [US] long-term [interest] rates."

US dollar assets because of economic, financial, or political developments in the United States compared with economic, financial, political developments in the rest of the world (Roubini and Setser 2005). It is certainly true that if such a run were associated with a substantial narrowing of the US current account deficit over a short period, the adverse effects on interest rates and the US economy would probably be dramatic from a starting point of essentially full employment. However, those are low probability assumptions. Moreover, the US economy is substantially more heavily dependent on foreign private investment than on foreign official investment in US assets, and private foreign holdings of US financial assets are small compared with holdings by domestic residents. If private investors lose confidence in US policies, private domestic investors have much larger portfolios out of which to bail.¹⁵

Figure 1 summarizes some relevant data on the stock of foreign official claims on the United States as a share of total foreign investment in US financial assets (excluding foreign direct investment), the share of foreign official inflows to the United States in total foreign inflows, the US current account deficit as a share of GDP, and the Federal Reserve Board staff's broad index of the real foreign exchange value of the dollar. The data in figure 1 support several broad observations.

The share of foreign official claims in total foreign financial claims on the United States in 2004 was less than half the share on average in the second half of the 1970s, which was 40 percent or more. The peak in flow terms was 74 percent in 1977.¹⁶

The recorded official share of total foreign financial investment in the United States has fluctuated over the past 30 years, but the overall trend has been negative. From the all time-high of 50 percent in 1978, it reached a low of 16.5 percent in 2001, rising back up only to 20.2 percent in 2004.

15. According to US flow-of-funds data for the end of 2005 published by the Federal Reserve, the foreign sector owns 13 percent of total US credit market assets. Based on the Commerce Department's data on the US net international investment position, official holders accounted for only 20.2 percent of all foreign holdings at the end of 2004 and probably a smaller proportion at the end of 2005, or 2.6 percent of total US credit market assets of \$40 trillion. (A reasonable estimate of the global stock of financial assets is \$150 trillion.) In other words, US private holders of 87 percent of such assets can exert much more influence over US financial markets by diversifying out of dollar assets. Based on IMF data on international investment positions of 76 countries at the end of 2004, their non-US holdings of international reserves were 5.6 percent of all cross-border financial liabilities excluding US liabilities, and 7.1 percent when foreign direct investment is also excluded. Lane and Milesi-Ferretti (2006) assemble similar data for 136 countries, and the roughly comparable percentages are 6.7 and 8.5 percent respectively.

16. We acknowledge that recorded official claims on the United States underestimate total official holdings of claims on the United States because they do not include claims held by private foreign financial intermediaries. See Higgins and Klitgaard (2004) and McCauley (2005). However, it is misleading to argue that all foreign official dollar reserves are claims on the United States; that argument fails to recognize that governments and private entities abroad issue liabilities in US dollar in the hundreds of billions every year. McCauley acknowledges that offshore placements do not strictly speaking finance the US current account deficit, but he contends that they do support the dollar. This analysis ignores the supply side of the equation. McCauley (2005, 60) reports, for example, the US-dollar debt issuance outside the United States in 2004 was \$257 billion net, and this figure does not take account of the increase in dollar liabilities by banks outside the United States to finance increases in their short-term dollar claims.

During the previous trough of the US current account balance in 1986–87, the official share of all foreign financial inflows averaged 21 percent. It reached 27 and 31 percent in 1992 and 1993, respectively, when the current account deficit was less than 2 percent of GDP. As the deficit widened to more than 4 percent of GDP in 2000, that share was a minuscule 6 percent. True, the foreign official share reached a recent high in 2003 at 34 percent, but declined the next year even as the deficit increased by a further one percentage point of GDP to 5.7 percent, and in 2005 the share dropped back further to 19 percent even as the current account deficit continued to expand to 6.4 percent of GDP.

Finally, the relationship between the performance of the dollar and fluctuations in the official share of foreign capital inflows to the United States appears to be weak to nonexistent (Wong 2006).

Thus, our conclusion is that there is no simple relationship between inflows of foreign official capital to the United States and the performance of the dollar and the US current account deficit. This should be no surprise. Many factors influence foreign capital inflows (private or official, net or gross), the US current account position, movements of the dollar, and the relative performance of the US economy. Moreover, these variables are all measured *ex post*—after prices, interest rates, exchange rates, and real economies have adjusted. Moreover, asset prices change in the absence of either flows or transactions. Therefore, these data tell us very little about *ex ante* motivations of different investors, only a few of whom are official entities with large portfolios.

Caution and Inertia in the Management of Foreign Exchange Reserves

The managers of a country's foreign exchange holdings, in the central bank, in the finance ministry, or in a separate entity (institutional arrangements differ among countries), have many reasons to be cautious about how they do their jobs. In some countries, the reserve managers may operate under legal restrictions or constraints. In others, they may be guided by principles adopted by a committee of senior officials or a body like the Federal Reserve's Federal Open Market Committee. In many cases, written standards or guidelines may be absent. However, in all cases, the managers of a country's foreign exchange reserves ultimately are likely to be held accountable in one form or another for their decisions. Consequently, all the legal, regulatory, and behavioral incentives support a posture of caution.

The reserve manager's first priority is to protect the value of the country's foreign exchange reserves, including their safe investment in impeccable assets or claims on first-class institutions. The reserve manager may be concerned about the potential appreciation or depreciation of his own currency. That concern creates incentives to intervene, which adds to or reduces reserve holdings, but those concerns are not immediately relevant to the choice of the currency in which to hold the stock of the

country's foreign exchange reserves once acquired.¹⁷

The reserve manager's second priority is to protect the liquidity of the country's foreign exchange reserves. This motive dictates concentrating holdings in short-dated instruments in deep markets and thereby to minimize transaction costs, including costs associated with converting from the country's intervention currency to another currency and potentially back again.¹⁸

The reserve manager's third priority is the return on the country's foreign exchange reserves. Naturally, everything else being equal in terms of value preservation and liquidity, the reserve manager and those officials who directly oversee him as well as his fellow citizens, who indirectly are affected by his decisions, would prefer that the country's reserves generate a higher, rather than a lower, return.

By way of illustration of these priorities, Reddy (2002), then deputy governor (now governor) of the Reserve Bank of India (RBI) stated, "The essence of management of reserves by the RBI is to ensure safety, liquidity and optimization of returns." He also described how the RBI's policy evolved over the previous decade from the use of a single indicator of reserve adequacy (coverage of three months of imports) to a multiple indicator approach.

The evolution of the policy of the RBI highlights an important point: Until a country's reserves accumulate to a certain level relative to the country's potential short-term or intermediate-term needs, the management of those reserves is relatively simple. The amounts are not large, and there is a premium on having them available when needed and on preserving their value. It is only when a country's reserves become substantial relative to the potential immediate needs of the country—most likely as a consequence of a sustained period of purchases in the foreign exchange market to resist the appreciation of the country's currency—that considerations of active reserve management become relevant.¹⁹ The

17. The person managing the portfolio of foreign exchange reserves also may be responsible for intervention decisions and can expect to be subject to ex post criticism (or worse) for those decisions as well. For example, the *Financial Times* (May 31, 2005) reported that Rerngchai Marakanond, former Thai central bank governor, was charged by a local court with "grave negligence" for squandering Thailand's reserves in the futile defense of the currency on the eve of the 1997 Asian financial crisis and was ordered to pay back \$4.6 billion. Because reserves are purchased with taxpayers' money, the relevant authority is expected to maintain their value for future generations in his intervention as well as his investment decisions.

18. Eichengreen (2005, 7) aptly comments, "It may pay to hold reserves in the most liquid market, which is the market in which everyone else holds reserves, but market liquidity is not all that matters. It may be worth tolerating a bit less market liquidity in return for the benefits of greater diversification . . . or for other commercial reasons." A "bit" may not be very much in terms of total reserve holdings, and less liquidity and higher returns can be found without changing the currency composition of a country's reserves, for example, by simply changing the composition of investment instruments.

19. Patnaik (2003) identifies two motives for India's build up of reserves: insurance and as a side effect of India's exchange rate policy. He concludes that the second motive dominated after March 2002 when India's foreign exchange reserves reached \$55 billion. Its reserves increased by \$20 billion over the next four quarters and by \$82 billion by the end of 2005.

authorities piling up the reserves start to think about maximizing the return on those investments over the longer term. One day the authorities wake up to, or are jolted into, the realization that they have accumulated more reserves than they might have intended, and questions begin to be raised about how to manage those reserves. This is our interpretation of events in Korea in late 2004 and early 2005.²⁰ The principal orientation of the authorities shifts from price (the exchange rate) to quantity (value and return). Politicians and those who elected or chose them begin to ask questions. This process has been repeated in many countries over the past three decades, ranging from the United States, whose holdings of foreign exchange tripled over two years from 1988 to 1990, to emerging-market countries like Korea, China, India, and Mexico.

If, in turn, the country itself is relatively large, the management of the accumulated holdings of foreign exchange may have implications not only for the taxpayers of the country but also potentially for the stability of the international financial system. A small country with large reserves as a percent of GDP—for example, Bulgaria with foreign exchange reserves of 33 percent of GDP holds only about \$8 billion in total—is in a position to manage them actively in the knowledge that diversifying the currency composition of those reserves will have no market effect on interest rates and, in particular, on exchange rates.

In contrast, a large country with substantial reserve holdings has to be concerned that the active diversification of a significant portion of its reserves—for example, moving 10 percent of India's \$137 billion in foreign exchange reserves from US dollar assets to assets denominated in euro or yen—could affect exchange rates at least in the short run and thus reduce the overall value of its reserves.²¹ As can

20. Note from table 1 that between 2001 and 2005, Korea's foreign exchange reserves doubled, and India's almost tripled.

21. The precise measurement of any capital gain or loss associated with the exchange rate effects of reserve diversification, if any, depends on the initial currency composition of the country's reserves as well as on (1) the size of the effect on exchange rates, (2) the currency in which the country values its reserve holdings, and (3) its own exchange rate regime. For example, a country whose currency is pegged to the dollar and values its reserve holdings in US dollars may shift 10 percent of its holdings into euro; the dollar value of its reserves will increase with the appreciation of the euro. On the other hand, if the country has a floating currency and values its reserve holdings in domestic currency, and if its diversification not only depressed the dollar relative to the euro but the dollar relative to its own currency, the paper capital loss may be substantial. We argued in our preliminary observations that the capital gains or losses on a country's foreign-currency reserves measured in domestic currency are not the overriding issues once the country has acquired the foreign exchange. What is relevant is not their value in domestic currency terms but the opportunity and transaction costs associated with switching between reserve holdings in different foreign currencies—as well as investments in the same currency. The choice about how much of a country's wealth should be invested in foreign-currency versus domestic-currency assets is a separable issue. If that is the source of concern about capital losses, then the country should have accumulated less foreign-currency assets initially. Moreover, the intended use of the reserves is to defend the country's currency or to meet its foreign-currency obligations. Even if the domestic currency appreciates, the reserves are still available to the same extent to accomplish those purposes, setting aside the issue of opportunity costs associated with shifts of holdings among foreign currencies.

be seen from table 1, China, Taiwan, Korea, Hong Kong, Singapore, Malaysia, Algeria, and Thailand each have more than \$50 billion in foreign exchange reserves, and those reserve holdings amount to at least 25 percent of GDP at the end of 2005.

It follows from the above discussion that the currency composition of a country's foreign exchange reserves, especially of countries with significant holdings, will display considerable inertia. Chinn and Frankel (2006) in their analysis of whether the euro will eventually surpass the dollar as the principal reserve currency, observe that the "intrinsic characteristics of a [reserve] currency are of less importance than the path-dependent historical equilibrium."

In their statistical analysis using aggregate IMF data, but not the revised data that we examine in the next section, Chinn and Frankel employ a lagged dependent variable to capture this inertia. They find it is substantial, with coefficients around 0.9 in their various statistical formulations. It is also important to note that Chinn and Frankel do not explicitly test for *active* reserve diversification; their dependent variables are value shares that capture both *passive* and *active* diversification. This introduces a downward bias in the coefficients, including the coefficient on the lagged dependent variable.

Raghuram Rajan (2006, 3) comments on the apparent inertia in reserve managers in responding to exchange market incentives and varying the composition of their reserve holdings, lagging behind their private-sector counterparts:

Profits are less important to central banks, and they are less likely to make a rapid shift in the composition of their reserve portfolio. But before central bankers turn decisively, foreign private investors who have no motive to buy dollars other than returns will have fled.

Central Banking Publications Ltd., a UK private research company, surveyed 56 central banks that covered 42 percent of world reserves as of mid-2005 and reported the results in *RBS Reserve Management Trends 2006* (Carver and Pringle 2006).²² This survey as well as Fels (2005), Genberg et al. (2005), and Stolper (2005) all report an increasing trend among the authorities managing countries' foreign exchange reserves toward "active reserve management" in which a higher priority is placed on profits, and there has been an increased appetite for risk.²³ They observe that preferences of reserve

22. The number of participants in the 2005 survey was smaller than the number that participated in the 2004 survey (65), and the reserve coverage was also smaller than in the earlier survey (45 percent). Ten respondents held more than \$50 billion in *total* international reserves, but there were 16 such countries by the end of 2005 and together they held 77 percent of all *foreign exchange* reserves as of that date. This suggests that the survey covers at most half of the relevant countries with large holdings. Note also that 63 countries with 65 percent of total reserves already report a good deal about the nature of the assets they hold because either they adhere to the IMF's SDDS or in the case of New Zealand voluntarily adhere to the SDDS reserves template.

23. Goldman Sachs, of course, has its own profit incentives to encourage and, perhaps, exaggerate this trend.

managers have broadened from a concentration merely on short-dated instruments to longer maturities and riskier classes of assets. At the same time, the Central Banking Publications survey reports a number of indicators of conservatism in reserve management and highlights the resource costs in terms of additional personnel and other expenses of active reserve management in order to control the associated risks.

As we have noted earlier, active reserve management has at least two meanings in this context: (1) consideration in investment decisions of a wider variety of instruments including the currency composition of reserves and (2) the framework that is used to reach and evaluate investment decisions. Both are relevant to reserve diversification, but it is also possible that there is more talk and less actual *active* reserve diversification because of caution and natural inertia on the part of reserve managers and those who provide guidance to them and evaluate their performance. For example, only 39 of the 56 respondents in the Central Banking Publications 2005 survey said they had changed the currency composition of their reserves over the past 12 months; twelve said that there was no change, and five did not respond to this question.

We conclude that the managers of a country's foreign exchange reserves have many incentives to be cautious and to display inertia as they discharge their responsibilities. This is particularly true in the larger countries whose reserves have increased substantially beyond their immediate needs. Those countries' actions have greater potential to move markets and to damage their own financial interests. In addition, the managers of those reserve holdings should favor guidelines and transparency about their activities because those devices will not only increase their accountability but also help protect them from ex post criticism. This observation supports our proposed International Reserve Diversification Standard to which we turn after we have reviewed the evidence that active reserve diversification has been limited to date.

RESERVE DIVERSIFICATION HAS BEEN LIMITED

Since the mid-1970s, the IMF has collected confidential data on the currency composition of the foreign exchange reserves of its member countries and published summaries of those aggregate data.²⁴ Unfortunately, despite the best efforts of the IMF staff, the country coverage of their data has varied over the years, and there have been changes and ambiguities in the methodology that the IMF staff has applied in assembling the data. However, those are essentially the only data available, at least until recently

24. The Bank for International Settlements (BIS) has collected on a confidential basis similar data on the reserve holdings primarily of the G-10 countries, for a longer period. The BIS staff cooperate with the IMF in compiling the aggregate data presented in figure 2 and often prepares its own analysis; see BIS (2005b, 95).

as discussed in the next section, to analyze trends in the currency composition of foreign exchange reserves.

Figure 2 presents the latest IMF data on the dollar's share in total foreign exchange reserves from 1973 until the fourth quarter of 2005.²⁵ Two series are shown: value share and quantity share.²⁶ Changes in the quantity share provide evidence on *active* or *stabilizing* reserve diversification. Changes in the value share provide evidence of *passive* reserve diversification, which may or may not have been combined with net *active* or *stabilizing* reserve diversification. For reference, figure 2 also includes the Federal Reserve Board staff's index of the foreign exchange value of the dollar in terms of the major currencies on a price-adjusted basis.²⁷

25. Figure 2 contains three breaks in series. The first break occurs after 1979 with the creation of the European Monetary Cooperation Fund (EMCF) to help finance intervention in the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS). Dollars were swapped into the EMCF in return for European currency units (ECU); these swaps show up as a decrease in the dollar's share in international reserves by reducing the numerator, and gold was also swapped for ECU, which decreases the dollar's share by raising the denominator. The data published by the IMF (2005a) do not allow one to unscramble these effects. Moreover, it can be argued there was a regime change in 1979. This break is represented in figure 2 by no line connecting the 1978 and 1979 observations for either the value or the quantity shares, which were rebased to 1979. Second, the IMF (end of year) data were recently revised back to 1995 on a more consistent and comprehensive basis; a stricter methodology has been applied for including a country's data, and much more limited use is made of estimated data (IMF 2005a). In figure 2, this break in series is represented by two observations for the end of 1995 for each share, but the quantity share going forward has been rebased to the same level as the value share. The third break in series, arguably another regime change, is in 1999 with the birth of the euro as the currency of the euro area and European Monetary Union. In this case, countries in the euro area extinguished their intra-area currency holdings. The dollar's share in reserves was boosted by a decline in the denominator. This break is represented by no line connecting the 1998 and 1999 observations for the value or quantity shares and rebasing the quantity share to 1999Q1. Note that the rebasing of the quantity shares implies that it is inappropriate to make judgments about *active* reserve diversification over the entire period.

26. Data from 1973 to 1995 are taken from table I.3 in the latest IMF Annual Report, which publishes information for a given year. Those data are in turn taken from the IMF's Composition of Foreign Exchange Reserves (COFER) database (IMF 2005a). In 2005, the IMF staff revised the methodology for estimating the post-1994 COFER data. In late 2005 the IMF also began to release on its Web site quarterly COFER data for 1999 and after. The new quarterly data are changed in two respects that create potential methodological discrepancies. First, the currency unit in which the data are reported is switched from the SDR to the US dollar; second, quantity and price effects are not estimated separately. US dollar denomination tends to increase the size of the changes in the quantity shares in response to given exchange rate movements. In figure 2, we continue to use SDR denomination, converting the data from US dollars to SDR. To calculate the quantity and price effects of the quarterly data, we employed the method used by the IMF staff. Quantity changes are derived by multiplying the changes in official holdings of each currency from the end of one quarter to the next by the average of the two SDR prices of that currency prevailing at the corresponding dates, and they are added onto the quantity at the end of the first quarter to construct the quantity series. (Price effects are the residual between changes in value and changes in quantity.) We constructed a quantity series using this methodology for the period beginning 1999Q1 through 2005Q4. The observations for this period in figure 2 are the relevant fourth-quarter data.

27. These are the currencies of the major industrial countries or monetary areas: the euro area (or the constituent countries before they joined the euro area), Canada, the United Kingdom, Switzerland, Australia, and Sweden, in

The underlying data on the currency composition of reserves are affected by additions to foreign exchange reserves during the period as the consequence of exchange market intervention.²⁸ It is a safe presumption that the dollar's share of official intervention purchases and sales in foreign exchange markets is higher than the dollar's share in foreign exchange reserves, which is 66.5 percent at the end of 2005 (IMF 2005a). Consequently, in periods of accelerating dollar purchases, unless one assumes that the authorities immediately align the currency composition of their marginal purchases with the currency composition of their portfolios prior to the purchases, there will be a tendency for the dollar's quantity share in reserves to rise.²⁹ For a number of reasons, including convenience and potential signaling effects, the authorities may adjust their portfolios only with a lag. Periods of widespread heavy intervention to resist currency appreciation are likely to appear in the data as periods of *stabilizing* diversification, which they are in the short run. Moreover, even with delayed readjustment of portfolios, the ultimate effects on the aggregate data also will be influenced by the fact that many countries are operating at the same time, on different scales, with different initial portfolio preferences. The effects of these differences of the aggregate data are conflated further by the fact that not all countries are on the same side of the market at the same time.

Bottom line: One should not overinterpret the IMF data.

With that caveat, what do the IMF data suggest? The dollar's share in official foreign exchange reserves is the principal preoccupation of those who speculate about reserve diversification. Therefore, we concentrate on the dollar's share.³⁰

The dollar had a very large share of international reserves in the 1970s immediately following the collapse of the Bretton Woods monetary system, which was a dollar-based regime. In the 1980s and early 1990s, the dollar's share was substantially lower and appears to have declined on balance. However, it rose after the early 1990s, and it was rising even before the Mexican and Asian financial crises. The positive trend from 1995 to 1998 was mainly driven by a rapid increase of the dollar's quantity share among industrial-country reserve holdings, from 52 to 65 percent, while the dollar's quantity share in the

order of the size of the weights as of December 15, 2005 (www.federalreserve.gov/releases/h10/weights). Since these currencies comprise most of the alternatives to the dollar, it is more appropriate to use this index in this context than the broad index displayed in figure 1.

28. Strictly speaking, the data may also be affected by borrowing in foreign currency that may be added to reserves, other governmental transactions (such as privatizations), and the accumulation of interest on reserves.

29. The IMF methodology for constructing the series for quantity shares (see footnote 26) treats net additions or subtractions from reserves over a quarter or four quarters as a quantity change, although they may be overstated or understated because of the influence of exchange rate changes during the period.

30. We present the data in figure 2 on an SDR basis. This numeraire tends to compress the decline in the dollar's quantity share in the context of dollar depreciation compared with measurement in dollars. Data for other currencies as well as the dollar's share on a dollar basis are presented in Wong (2006).

reserves of developing countries fluctuated between 67 and 70 percent, with little change on balance.³¹ The dollar's share has shown little trend since 1999, when the euro was introduced; a 4.5 percentage point decline in the dollar's value share was combined with a small net decline in its quantity share of 2.8 percentage points over six years—half a percentage point a year.³²

Movements in the dollar's value share, reflecting principally the influence of *passive* reserve diversification, diverge substantially from movements in the dollar's quantity share; the latter includes the net of *active* diversification away from the dollar and *stabilizing* diversification in favor of the dollar.

It would appear that when the dollar weakens on a sustained basis, its value share declines and its quantity share tends to rise. Conversely, when the dollar strengthens on a sustained basis, its value share tends to rise and its quantity share tends to decline. Table 2 provides a detailed summary of five episodes of sustained dollar weakness and four episodes of sustained dollar strength.³³ On average the shares changed as expected. In all five cases of dollar weakness, the dollar's quantity share rose. In four of the five cases of dollar weakness, the dollar's value share declined. The exception was the 1993–95 period, when the value share was essentially unchanged; the dollar also declined the smallest amount during this period.

The results for the periods of dollar strength are less clear-cut; on average the quantity share declined, and the value share rose. However, in one of the four cases, the dollar's share declined in both value and quantity terms, although the decline in the value share was tiny. In two other cases, the dollar's quantity share rose, contrary to our hypothesis, along with the rise in the value share. In the final case, the value share rose, as expected, but by a very small amount.

31. During this period, total foreign exchange reserves of industrial countries in SDR grew by 8 percent, with Japan contributing to more than 80 percent of this increase. Over the same period, the foreign exchange reserves of the developing countries rose 33 percent and the reserves of those developing countries contributing to the COFER database rose 61 percent.

32. The aggregate dollar share of the industrial-country group, whose COFER reserves rose 78 percent between 1999 and 2005, increased 0.2 percentage points in value terms to 73.7 percent in the fourth quarter of 2005 as its quantity share increased 1.8 percentage points. Japan, the euro area, and the United States hold 84 percent of the foreign-currency reserves of the industrial countries, and Japan with 67 percent of the total dominates the aggregate statistics. As noted earlier, these economies are more limited in their outlets for reserve diversification. For the developing-country group, whose COFER reserves rose 116 percent, the dollar's value share declined 7.7 percentage points to 60.5 percent in the fourth quarter of 2005 as its quantity share declined by a smaller 6.2 percentage points.

33. The published aggregate IMF data on the currency composition of reserves are on an end-of-year basis. This suggests that one should look at corresponding movements in the foreign exchange value of the dollar on an end-of-year basis, as we do in table 2. However, a case could also be made that the dollar may have been stronger (weaker) during the year than suggested by an end-of-year observation, prompting less (more) sales (purchases) of dollars during the year. Therefore, we looked also at periods chosen on the basis of the dollar's average value for the year. The results *on average* are the same as in table 2, but only one of the nine individual cases (six depreciations and three appreciations) fits the expected pattern; see Wong (2006).

The four periods of dollar strength differed considerably in terms of what was going on in the global economic and financial system. The late 1970s and early 1980s not only followed a period of pronounced dollar weakness but also saw the emergence of the European Monetary System (EMS) and a build-up of cross-holdings of intra-EMS currencies. The period in the early 1990s followed periods of pronounced dollar weakness and a substantial rise in the dollar's quantity share. The early 1990s also was a period of turmoil within the EMS, prompting European sales of nondollar reserves that tended to boost the dollar's quantity share. The late 1990s was a period of rapid reserve build-up by countries affected by financial crises that may have had underlying currency preferences that tended to favor the dollar. These results emphasize that the IMF data combine contemporaneous information from countries in widely varied circumstances during periods that differ substantially with respect to global trends.

The IMF publishes separate series for the traditional industrial countries, as listed in *International Financial Statistics*, and some developing countries. The two series reveal differences in the trends in the US dollar's share.³⁴ For the period 1999Q1–2005Q4, the dollar's share of the reserves of the industrial countries as a group increased in both value and quantity terms. Although the IMF is not authorized to publish the currency composition of the reserves of individual countries, the quarterly data for industrial countries are dominated by Japan's reserves purchases. Japan's reserve accumulation over 2002Q4–2004Q1 was predominantly in US dollars. Over this period, Japan's total foreign exchange reserves increased by \$354 billion, at the same time the IMF's Composition of Foreign Exchange Reserves (COFER) total dollar reserves for industrial countries increased by \$315 billion. Most other industrial countries did not increase their total reserves significantly over the same period, and the few that did could account for only a maximum of \$13 billion of the \$315 billion total increase in dollar holdings. This suggests that at least 80 percent of the net increase in Japan's reserves was in US dollars, as its authorities sought to resist the yen's appreciation. In 2004Q2, Japan suspended its foreign exchange intervention, and the dollar's share in the quantity data for industrial countries correspondingly plateaued.

On the other hand, the IMF data for developing countries as a group for the period 1999–2005 indicate a gradual decline of the dollar's share in both value and quantitative terms (see footnote 32). It is not possible to distinguish any particular large reserve holders' movements from the quarterly changes, as they are less distinctive than for the industrial countries as a group. Nonetheless, the more active intervention in foreign exchange markets by developing countries is observable in the data. For example, the smooth decline of the US dollar's share in value and quantity terms that began in 2001 accelerated at the beginning of 2005, when the US dollar began a year-long appreciation. During this period the dollar's quantity share declined as the dollar rose on average against the major currencies. This pattern implies

34. See Wong (2006) for additional analysis of this point.

that the developing countries on average either intervene primarily for the purpose of dampening the dollar's appreciation or tend to sell dollars when their price is rising. This pattern is less clear in the series for the industrial countries as a group.

The overwhelming impression of figure 2 is that international reserve diversification is not a big deal. Over 25 years since 1980, the year-to-year changes in the dollar's quantity share have been small—2.2 percent on average in absolute terms.³⁵ The dollar's quantity share has fluctuated over a range of 20 percentage points since 1980, and the fluctuation in the value share has been over a range of closer to 15 percentage points. To put these data in perspective, 2.2 percent of \$4.2 trillion in total foreign exchange reserves as of the end of 2005 is \$92 billion. According to IMF data on the international investment positions of 76 countries, the \$92 billion is only 0.21 percent of the total of \$43 trillion in cross-border financial liabilities excluding the United States and all foreign direct investment. If that adjustment occurred smoothly over 250 trading days during the year, the resulting average amount would be slightly more than \$367 million a day, which is a trivial amount in the context of total foreign exchange market turnover approaching \$2 trillion a day in 2004 (BIS 2005a). We acknowledge that this adjustment might not occur smoothly. This is why we favor an International Reserve Diversification Standard to reinforce the incentives for gradual adjustment by the larger holders.

Consider as well the fact that during 2004 the US dollar depreciated in price-adjusted terms by 5.7 percent against other major currencies. Over the year, the dollar's value share in global foreign exchange reserves declined by 0.1 percentage points. That translates into a net change of \$2.2 billion or about \$9 million on average for each of the 250 trading days in the year, but this was the effect of passive diversification relative to end of 2003 allocated reserves in the IMF data . In quantity terms, the dollar's share actually rose over 2004 by 0.9 percentage points because of net stabilizing diversification, amounting to \$20 billion or \$80 million per day on average.

Thus, we conclude that if history is a guide, and it may not be, international foreign exchange reserve diversification is not likely to be a major driver of financial-market developments, although the psychological effects of reports of actual diversification could enhance the direct effects. It follows that rumors about reserve diversification whether or not confirmed do affect financial markets and the volatility of those markets. If those effects could be substantially reduced, not only would financial markets perform better (with less noise) but also the authorities in countries with large holdings might find they have more—not less—scope to adjust the currency composition of reserve holdings because of the greater exchange market stability. That is the motivation for the establishment of an International Reserve Diversification Standard to which we now turn.

35. The simple average change is only 0.2 percent.

TOWARD AN INTERNATIONAL RESERVE DIVERSIFICATION STANDARD

In our preliminary considerations, we reviewed the dramatic accumulation of foreign exchange reserves (see table 1). Edison (2003) examines whether the accumulation had been excessive as of the early part of the decade and carefully suggests a positive conclusion. A more recent International Relations Taskforce of the ECB (2006, 12) argues that “reserve accumulation in most countries has gone beyond levels warranted by conventional indicators, suggesting that the build-up is largely influenced by other factors.” Aizenman and Lee (2005) argue to the contrary that the build-up is justified by rational precautionary motives in a world of more volatile capital flows, but it is noteworthy that their empirical tests exploit data only through 2000. Rodrik (2006) argues that the accumulation has been excessive and not in the interests of the accumulators. Finally, Summers (2006) observes that global reserves of many emerging-market economies are substantially in excess of any previously enunciated criterion of need for financial protection. Whatever one thinks of the arguments about motivation, the dramatic, rapid accumulation of foreign exchange reserves in recent years has transformed the topic of the management of foreign exchange reserves from one of national debate to potential international concern. How a country manages its reserves is appropriately a concern of other countries as well as its own citizens.

Against this background, we propose the collective voluntary adoption by the major reserve holders in particular of an International Reserve Diversification Standard to address the perceived adverse consequences for the international financial system from sudden large-scale diversification of the currency composition of the foreign exchange reserves by a major holder, to reduce the volatility of financial markets in response to rumors about such actual or potential reserve diversification, and to provide scope for large holders to manage their reserves responsibly as well as rationally. We should emphasize that the objective should be to reduce unwarranted volatility, not to eliminate all volatility; at times, such volatility provides useful signals of market sentiment about underlying conditions.

Our proposed standard consists of two basic elements: (1) routine disclosure of the currency composition of official foreign exchange holdings and (2) a commitment by each adherent to adjust gradually the actual currency composition of its reserves to any new benchmark for those holdings. We elaborate our thinking about each of these elements, in turn, and consider the arguments for and against them.

Routine Disclosure

The principal element of our proposal is that participating countries would commit to disclosing routinely the currency composition of their official foreign exchange reserves. The disclosure preferably

would be monthly with a lag of a week or perhaps a month. However, quarterly disclosure would not be inconsistent with the spirit of our proposal, which is to demystify the currency composition of foreign exchange reserve holdings and thus contribute to greater stability in the international financial system.

The first argument against such disclosure is that the authorities responsible for a country's foreign exchange reserves should not and would not do so. The counterargument is that the authorities in some countries now regularly disclose the currency composition of their international reserves (table 3). Based on the information we have been able to assemble, 23 countries now make such disclosures at least annually, including 11 industrial countries, 7 transition countries in Eastern Europe and the former Soviet Union, and 5 emerging-market economies.³⁶ In many cases, this disclosure is a voluntary supplement to the Data Template on International Reserves and Foreign Currency Liquidity ("reserves template") of the IMF's SDDS.³⁷ See box 1 for a brief history of the SDDS and the reserves template component.

In September 2001, the IMF Executive Board adopted the Guidelines for Foreign Exchange Reserve Management. A number of those guidelines drew upon the IMF's Code of Good Practices on Transparency in Monetary and Financial Policies: Declaration of Principles, which was adopted in September 1999 following the incorporation of the reserves template into the SDDS. In particular, with respect to transparency, the guidelines borrowed from the code (IMF 2001, 4):

The allocation of reserve management responsibilities, including agency arrangements, between the government, the reserve management entity, and other agencies should be publicly disclosed and explained. The broad objectives of reserve management should be clearly defined and publicly disclosed, and the key elements of the adopted policy explained.

In the late 1990s and early part of the 21st century, disclosure in this area was a growth industry. Table 3 provides a list of the 23 disclosing countries along with the size of their foreign exchange reserves as of the end of 2005, the shares of their reserve holdings as of the end of 2004 in US dollars, euro, yen, and other currencies, and the change in those shares from 2000 to 2004. Box 2 provides a brief comparison of the data presented in table 3 for 19 of the 23 countries with the IMF aggregate data on the currency composition of foreign exchange reserves. Wong (2006) provides additional detail and analysis.

36. Nine of the countries disclose this information monthly with a lag of one or two months: Australia, Croatia, Latvia, Peru, Slovak Republic, Switzerland, the United Kingdom, the United States, and Uruguay. The remaining countries publish their data annually. A few only partially disclose the currency composition of their reserves, for example, Hong Kong and Peru.

37. Among the 23 disclosers, only New Zealand is not among the 62 subscribers to the SDDS, but New Zealand voluntarily adheres to the reserves template of the SDDS.

Box 1 Background on the Reserves Template of the SDDS

The Special Data Dissemination Standard (SDDS) was put in place in 1996 in the wake of the Mexican crisis of 1994–95. It is designed to provide market participants with systematic and timely information on key economic and financial variables for countries that have or seek access to international capital markets. Subscribers commit themselves to providing timely detailed data on five categories of information—national income and prices, the fiscal sector, the financial sector, the external sector, and population—and thereby demonstrate their transparency. Starting with only 10 subscribers in 1996, participation quickly increased to 47 by 1998. Today, 62 IMF members subscribe to the SDDS.

As part of the SDDS requirements, the 62 subscribers report details about their official international reserve holdings following the format of the International Reserves and Foreign Currency Liquidity Template (Kester 2001). Widely seen as the most demanding part of SDDS requirements, this reserves template was established in response to concerns arising from the Asian financial crises of 1997–98. Based on the then-published information, Thailand and Korea appeared to have sufficient international reserves to weather that tumultuous period. It turned out that the Thai monetary authorities had been disguising the fact that their actual reserves were effectively depleted, since they did not publish the extent of their forward commitments. Korea's published reserves also exceeded the size of usable reserves because most had become illiquid deposits in bankrupt Korean financial institutions. These information discrepancies exacerbated the shock felt by the market when both countries suddenly announced defaults.¹ This experience catalyzed widespread recognition of deficiencies in reporting on international reserves and subsequently the development and adoption of a systematic and detailed framework for reporting timely and accurate data.

Three groups or institutions were involved in the effort: the G-10 central banks, a G-22 country group composed of both industrial and emerging market economies (the Willard Group), and the IMF. Each group examined the issue, and each concluded that a more precise framework for reporting reserves was needed.² The IMF staff had already begun to develop a template for the disclosure of reserves data in the context of the Interdepartmental Task Force on External Debt and Reserves, at the request of the IMF executive directors (IMF 1998). The Euro-Currency Standing Committee (ECSC, since renamed the Committee on the Global Financial System), of the G-10 central banks also identified the deficiencies with regard to data disclosure on reserves and drafted a reserves template (BIS 1998a). Representatives from the ECSC working group, working closely with the IMF staff, later produced a technical report (BIS 1998b). This report was released in December 1998. The final proposal was released in March 1999, as the Data Template on International Reserves

1. Alan Greenspan commented in a speech at the Financial Crisis Conference, Council on Foreign Relations, New York (July 12, 2000), "A high level of transparency in the way domestic finance operates and is supervised is essential if investors are to make more-knowledgeable commitments and supervisors are to judge the soundness of such commitments by the financial institutions that they supervise. I find it difficult to believe, for example, that the crises in Thailand and Korea would have been nearly so virulent had their central banks published data prior to the crises on net reserves instead of the not very informative gross reserve positions only. Some private capital inflows would almost surely have been withheld, and policymakers would have been forced to make hard choices more promptly if evidence of difficulty had emerged earlier."

2. All three had produced draft reports on the subject by September 1998. While the ECSC working group and IMF has already drafted a preliminary template by September 1998, the G-22 working group focused on the broader set of issues related to transparency and accountability in their report (G-22, 1998).

Box 1 (continued)

International Reserves and Foreign Currency Liquidity (“reserves template”) and was incorporated by the IMF into the SDDS. The final version was approved in 2001.

The main features of the reserves template include:

- *Coverage:* The template provides the first common reporting framework for detailed disclosure of gross and net reserves. There are four sections in the template: (1) official reserves assets and other foreign currency assets at market value, (2) predetermined short-term net drains on foreign currency assets in nominal value, with a maturity breakdown, (3) contingent short-term net drains on foreign currency assets at nominal values, (4) various memo items including the currency composition of the reserves. The first section reports the amount and location where the reserves are held and thus allows the public to gauge the monetary authority’s ability to use those funds under different financial circumstances. The template also requires the monetary authority to report any short-term forward commitments of reserves or encumbered reserves and the breakdown of the maturity of those commitments, thus allowing the public to estimate the amount of usable funds actually available at a specific time in the future. Off-balance sheet foreign-currency activities of central banks as well as other public sector entities are reported.

While disclosure of the individual currency composition of reserves is optional under the memo item section, SDDS subscribers are supposed to disclose the amount of reserves denominated in SDR currencies in aggregate at least once per year. Currently, at least 53 countries disclose this information each month for their combined \$1.5 trillion dollars worth of reserves (38 percent of world reserves) in 2005. Ninety-eight percent of their reserves are held in the four SDR currencies: the dollar, the euro, pound sterling, and the yen.

- *Periodicity, disclosure lag, timeliness:* Since all items on the template are to be reported with the same standard of periodicity and lag, the data are comparable and market analysts are aided in gauging the actual liquidity position of the monetary authorities. All IMF SDDS subscribers are required to publish information on their international reserves according to the reserves template at least monthly with a lag of a month. New Zealand does so as well.

In recent years evidence has begun to accumulate that market participants are rewarding SDDS subscribers in the form of better terms on external financing. Cady (2005) and Cady and Pellechio (2006) found that subscription to SDDS reduced primary-market yield spreads by an average of almost 20 percent in 26 major emerging economies. As the number of SDDS subscribers grows, the Fund faces rising challenge in monitoring member adherence to the standard. In its Sixth Review of the Special Data Dissemination Standard (IMF 2005), the IMF staff put forward a plan to automate SDDS monitoring, to increase efficiency of monitoring observances, and to establish procedures for dealing with subscribers with recurrent and serious deviations. Starting in 2007, the IMF will begin posting information on the extent of subscriber observances of the SDDS on the Dissemination Standards Bulletin Board (DSBB).

Together the disclosing countries hold 13 percent of global foreign exchange reserves. The 11 industrial countries account for 25 percent of industrial-country foreign exchange reserves.

The other 12 countries account for 8 percent of the reserves of nonindustrial countries.³⁸ Seven of the disclosers are among the top 25 holders of foreign exchange reserves, but only Hong Kong is among the top 10. However, more than three quarters of the nondisclosers in the top 25 subscribe to the SDDS including its reserve template, which requires the disclosure of substantial information about their international reserves on a monthly basis with no more than a month's lag.³⁹ Under the reserves template of the SDDS, countries are required to disclose at least annually the combined share of their reserves in the four currencies of the SDR basket: US dollar, euro, yen, and pound sterling.⁴⁰ The 22 members of the IMF that are listed in table 3 (excluding Hong Kong) presently have 40 percent of the voting power in the IMF.

Therefore, the vast majority of the large holders of foreign exchange reserves are on weak ground if they argue that releasing detailed information on their international reserves would reveal to the market too much information about their reserve holdings. They already have obligated themselves to reveal a great deal about those holdings with a one-month lag and the additional information involved in the currency composition of their reserves would be only a modest increment in the amount of information provided to the market.

Moreover, we already know a great deal about the currency composition of Japanese foreign exchange reserves even though the Japanese authorities, to date, have declined to disclose this information. We can reliably estimate that the share of the dollar in Japanese reserves at the end of 2005 was between 83 and 89 percent. We base our estimate on three sets of facts: (1) Every industrial country reports the currency composition of its international reserves to the IMF for aggregate publication in the subcategory of industrial countries in the COFER series. (2) A substantial number of these industrial countries also individually disclose the currency composition of their reserves. (c) Those industrial countries that do not individually disclose are primarily Japan, holding no yen in its reserves, or in the euro

38. In 2000, shortly after the reserve template in the SDDS became effective, the respective percentages were 21, 32 and 14. The reserves of the non-disclosers have increased at a more rapid rate than those of the disclosers.

39. The four exceptions are China, Algeria, the ECB, and Libya. (Taiwan—a nonmember of the IMF—voluntarily adheres to the SDDS but not to the reserves template.) The foreign exchange reserves of these five holders amounted to 27 percent of total foreign exchange reserves as of the end of 2005. Moreover, they could voluntarily adhere to a revised reserves template associated with this proposal. In fact, China has indicated on its page adhering to the IMF's less-rigorous General Data Dissemination Standard (GDDS) that it has completed preparatory work for compiling its reserves data following the SDDS reserves template.

40. As far as we can determine, 30 of the 41 countries that do not disclose more detailed information on the currency composition of their reserves comply with this provision of the reserves template. Those countries account for 24 percent of end-2005 foreign exchange reserves. Their holdings in non-SDR currencies amounted to only 1.4 percent of their foreign exchange reserves, slightly less than the share (2.7 percent) for the countries making fuller disclosure.

Box 2 Comparison of IMF Aggregate Data with Data for 23 Disclosing Countries

High accumulations of reserves by many countries in recent years, plus occasional rumors of official reserve diversification, motivated our investigation of a rarely asked question: How many countries today disclose the individual currency composition of their foreign exchange reserves? The answer is that 23 countries—13 percent of total world foreign exchange reserves in 2005—publish this information, with a modest time series available for 19 of those countries.

How representative of the total population is this sample? This group consists of 11 industrial countries and 12 emerging-market economies. Because of the overrepresentation of small European countries and candidate members of the European Union, these data may overstate the decline in the US dollar share over 2000–2004. But a comparison in the value data of this sample with data from the IMF's Composition of Foreign Exchange Reserves (COFER), which is a moving sample of at least 107 countries—24 industrial and 83 to 90 developing countries—reveals some striking parallels between the two series (table B2.1).

Table B2.1 Value shares (percent)

Currency	Truman-Wong data		IMF COFER data	
	2004 share	Change since 2000	2004 share	Change since 2000
US dollar	50	-6	66	-5
Euro	36	+12	25	+7
Yen	7	-5	4	-2
Other	7	-1	5	+1
	100	0	100	0

The 19 countries' value data indicate that the US dollar's reserve share has declined by 6 percent over the five years, almost matching the IMF COFER decline of 5 percent. Our data also show almost twice as large an increase in the euro share than the IMF COFER series, unsurprisingly so. The broad conclusion from our data is the same as that from the IMF COFER value data: The increase in the euro share over 2000–2004 took place almost as much at the expense of the yen as at the expense of the dollar.

On an individual-country basis, the conclusion is less clear-cut. The simple average of the seven Eastern European transition countries indicates that they reduced their dollar reserves value share by 22 percent over 2000–2004 and increased their euro reserves value share by 29 percent. Other than the Eastern European transition countries, five countries (Canada, the Philippines, Switzerland, the United Kingdom, and Germany) reduced their dollar value shares. The simple average of the decline is 10 percent, with an average increase in euro share of 11 percent. Casually interpreted, this can be seen as evidence of passive and possibly active diversifications from dollars into euros. Seven countries, excluding the United States but including the Slovak Republic, increased their dollar reserves value shares.

Box 2 (continued)

As we have stressed, the shortcoming in analyzing reserve diversification with value data is that exchange rate changes mask the changes in real official demand for the currency. Dollar depreciation and euro appreciation from the end of 2001 to the end of 2004 overstate the real change in official demands.

Hence we re-created quantity series comparable with the quantity series taken from the IMF COFER data by applying the same methodology. This series filters out the valuation effects of exchange rate changes and presents a series affected by only active changes in the stocks of the currencies.

On a disaggregated level, the average decline of the dollar quantity share for the seven Eastern European countries is 19 percent, slightly lower than the value series. The average increase in the euro share is 20 percent. But other than countries in this region, only two other countries actively altered their portfolio allocation away from the dollar: Canada and the Philippines. The average decrease in the dollar's share is 11 percent for the two countries, with an average increase of 11 percent in the euro share. This appears to confirm the trend observed in the value series, where losses in the dollar share are driven by increases in the euro share.

However, aggregated quantity series from both the COFER data and our group of countries show that the dollar quantity share in fact rose by 1 percent over 2000–2004. Other similarities can be observed from these two sources. The most striking is the conclusion that the increase in the reserve role of the euro did not replace that of the dollar—but it replaced the yen and other reserve currencies (table B2.2).

Table B2.2 Quantity shares (percent)

Currency	Truman-Wong data		IMF COFER data	
	2004 share	Change since 2000	2004 share	Change since 2000
US dollar	58	+1	71	+1
Euro	28	+5	21	+1
Yen	8	-4	4	-2
Other	6	-2	5	0
	100	0	100	0

In some respects, the similarities between our 23-country sample and the IMF data are not by chance. European countries tend to be more willing to provide the data to the IMF and Asian countries are less so. This gradient in transparency is reflected in our sample.

area, holding no euros.⁴¹ The lower estimate of the dollar's share in Japan's foreign exchange reserves assumes that Japan holds the entire unallocated amount of euro and all of the other nondollar currencies not otherwise accounted for. The high estimate assumes that Denmark holds only euro in its reserves and that the nondisclosing euro-area countries hold all the nondollar currencies not otherwise accounted for.

41. We use the end-2004 shares from table 3 in our estimates.

In our view, not only Japan but also the large holders in general have the most to gain from disclosing the currency composition of their foreign exchange holdings:

- The value of large holders' reserves is most affected by financial-market volatility associated with rumors of reserve diversification.
- Large holders are most tightly constrained to limit the scale of their *active* diversification of their foreign exchange reserves because of the potential affects of changes in market prices on the valuation of their own reserves.
- Most important, taxpayers of large holders have a major stake in the management of their international reserves. Recall that 21 of the countries listed in table 1 had foreign exchange holdings as of the end of 2005 of at least 10 percent of GDP.
- Only three of those 21 currently disclose the currency composition of their foreign exchange reserves, but 13 of the remaining 18 subscribe to the SDDS and its reserves template. Disclosure of the currency composition of a country's foreign exchange reserves is not just about transparency with respect to international financial markets and reducing the volatility of those markets but also about the accountability of the managers of those reserves to the taxpayers in their own countries.

Gradual Portfolio Adjustment

The second element of our proposal is that participating countries would commit to making gradual adjustments in the currency composition of their foreign exchange reserves in response to changes in any official benchmarks for their holdings. Those benchmarks would not necessarily be publicly disclosed except implicitly via the regular disclosure of actual reserve holdings. If countries merely committed to the gradual adjustment of portfolios, presumably the market would be able to monitor their actions based upon their regular disclosures.

This component of our proposal could be implemented in a number of ways. A country might leave open the time period over which the adjustment would take place. This approach, although providing maximum discretion, would appear to be inconsistent with the overall intent of our proposal: to limit unnecessary exchange market volatility associated with rumors of active reserve diversification, including the risks associated with front-running by private participants in exchange markets.

Therefore, it would appear to be more reasonable to expect countries to articulate a rule or guideline. The guideline might well differ depending on the country or circumstances. In other words, the speed of adjustment might be stated broadly at the same time that the new benchmark was announced—

for example, at least 2 percentage points a year or quarter and no more than 5 percentage points. Alternatively, the commitment might be more general, for example, the country might do no more than state that the adjustment would be “gradual” over a period of three to five years or 10 to 20 quarters.

Stating the process of adjustment in value terms might provide more stability to the market because it would suggest that if movements in market exchange rates were producing a substantial amount of *passive* diversification, the amount of *active* diversification would be constrained. On the other hand, there might be some advantage in terms of clarity if the process of adjustment were stated in quantity terms.

What are the arguments for this component of our proposal?

First, the commitment to gradual adjustment would recognize the fact that for a variety of reasons countries might want to change the currency composition of their reserves. The reasons may relate to market developments, including risk-return considerations associated with movements in exchange rates. They may be driven by other considerations, such as changes in sovereign borrowing patterns.⁴² They may be driven by changes in the country or currency composition of a country’s trade. They may be affected by a political decision to join or associate with a currency area such as the euro area, as appears to have been the case for many of the countries in Eastern Europe listed in table 3. Thus, the International Reserve Diversification Standard must not be too rigid. It is not meant to prevent reserve diversification, only to contribute to constructive reserve management.

Second, recognizing that countries will want to alter the currency composition of their foreign exchange reserves, it is desirable to minimize the effects on financial markets of implementing their decisions. As noted earlier, *active* reserve diversification is the same as sterilized foreign exchange market intervention against the currency being sold and in favor of the currency being purchased. Views differ on the effects and effectiveness of such activity especially with respect to assets denominated in the major currencies with their large liquid markets and many available instruments. However, a substantially larger consensus supports the view that the effects of sterilized foreign exchange market intervention tend to dissipate over time either in terms of the half life of the effects of a particular operation or the overall effects of a continuing operation. Hildebrand (2005) describes the origins and execution of the transparent program of gold sales by the Swiss National Bank, which appears to have had essentially no

42. As noted earlier, sovereign borrowing associated with the conversion of the proceeds into domestic currency can be considered to be foreign exchange market intervention. Moreover, a technical case can be made that the International Reserve Diversification Standard should be defined in terms of net foreign-currency positions. However, this would appear to be an unnecessary technical wrinkle in light of the fact that we are principally interested in the reserve management practices of countries with large net as well as gross reserves.

market impact.⁴³

Third, recall the evidence presented above that in the aggregate, countries do not make large, abrupt adjustments in the currency composition of their reserves. We do not have a great deal of evidence on the behavior of individual countries, but we can examine the pattern of changes from 2000 to 2004 in the dollar's share in reserves of four countries listed in table 3 that hold more than \$20 billion in foreign exchange reserves.

For Canada and Romania there was a decrease in the dollar's value share of more than 25 percentage points.⁴⁴ The declines in value shares were 27 percentage points for Canada and 37 percentage points for Romania. In the Canadian case, holdings of US dollars declined by \$7.3 billion over the four-year period. On the other hand, actual purchases of euro were only \$3.0 billion in active diversification, and \$5.4 billion of the boost in the euro's share in Canada's reserves was via passive diversification out of dollars. In the Romanian case, in contrast, actual holdings of US dollars rose by about \$3.3 billion over the four years, and actual purchases of euro were only about \$0.5 billion, with the remainder of the increase in the euro's share accounted for by the effects of passive diversification out of dollars on existing holdings of euro.

The dollar's value share in Hong Kong's and Norway's reserves increased more than 10 percentage points over the four years.⁴⁵ Hong Kong added \$18.8 billion in dollar holdings over the period and sold \$11.5 billion of euro and yen; the effects on the dollar's share of Hong Kong's reserves of these latter sales were offset in part by \$7.7 billion in positive valuation effects. Norway also added \$9.4 billion to its dollar holdings over the period, while buying about \$0.5 billion in euro and selling \$0.8 billion in

43. The Swiss National Bank's program to sell half its gold reserves (1,300 tons) over almost six years from May 2000 to March 2005 differed in several respects from any country's program of diversification of its foreign exchange reserve holdings. The Swiss sales program was aided by the September 1999 Washington Gold Agreement involving the Swiss National Bank (SNB), 13 other European national central banks, and the European Central Bank (ECB). The Washington agreement and its successor agreement five years later informed the market that there would be an upper limit on the gold sales by these institutions and set annual quotas. This was important in the context of a large overhang of official gold holdings and a rising trend of official gold sales. Moreover, through most of the last five years of the SNB's gold sales, the market price of gold was increasing. On the other hand, the gold market is much shallower and less liquid than foreign exchange markets for the major currencies. As explained by Hildebrand (2005), for a number of reasons and using several devices, the SNB was able to dispose of its gold at an average price that exceeded the average London fixing price during the period of sales. He emphasizes, however, the importance of an institutional framework based on a clear transparent sales strategy that limited the discretion of the SNB's governing board and its trading desk.

44. All the calculations in this and the following paragraph are made using the US dollar as the numeraire, in contrast to the use of the SDR as the numeraire in figure 2 and box 2.

45. The change in the US dollar share for Hong Kong may be overstated because since 2003 Hong Kong has reported only the split in its holdings between a "dollar bloc" that may also include Australian, Canadian, and New Zealand dollars and a "non-dollar bloc."

yen. However, Norway experienced \$5.8 billion in the effects of passive diversification out of dollars on its holdings of these two currencies. The lesson we draw from examining these four cases is that one should be careful about reading evidence of active diversification into the behavior of reserves shares of even individual countries. The only one of the four countries that falls in this category is Canada.

It is also noteworthy that, on April 21, 2006 the Swedish Riksbank announced that over the previous four weeks it had diversified 26 percent of its \$21 billion in foreign exchange reserves from US dollars, yen, and sterling into euro, Norwegian kroner, Australian dollars, and Canadian dollars. The total amount was about \$5.5 billion or \$275 million per day on average with no reported effects on exchange rates or conditions in financial markets.

Thus, the revealed behavior of holders of large amounts of foreign exchange reserves suggests that they would not have much to lose from a commitment to a gradual adjustment process, since their adjustments are gradual in any case. Moreover, in the context of the International Reserve Diversification Standard, they might have greater confidence that their actions would not cause undue market disruption.

A case can be made that the International Reserve Diversification Standard would be strengthened if the second component included a commitment by each participating country to announce in advance (1) its benchmark for the currency composition of its reserves and (2) changes in that benchmark.⁴⁶

The benchmark might be expressed in quantity terms, for example, 50 percent dollars, 30 percent euro, 10 percent yen, and 10 percent other currencies, plus or minus 3 to 5 percentage points. This formulation would provide the leeway for countries to engage in a certain amount of *active* or *stabilizing* diversification as a counterpart of their routine foreign exchange intervention operations. It would permit or accept passive diversification in connection with relative movements in foreign exchange rates.

A positive by-product of an International Reserve Diversification Standard that included the public announcement of benchmarks for the composition of international reserves of the participants in quantity terms would be the tendency to limit the build-up of holdings in the intervention currency that creates a potential overhang. This formulation would encourage on-going diversification on the margin to conform to a country's benchmark. In effect every time a country intervened in the foreign exchange market to purchase foreign currency in its intervention currency, it would be expected to diversify a preannounced proportion of those purchases into other foreign currencies within a short period. This feature would also tend to disperse the pressures of intervention in one currency across a larger number of currencies. This tendency might improve the functioning of the international monetary system by introducing more multilateral balance into its operation and avoid the build up or overhangs of reserve

46. Truman (2005) originally put forward our proposal in this form.

assets in US dollars. This aspect presumably would lead to more actual diversification than is observed today, and not all countries would welcome these effects.

Alternatively or in addition, a country might express its benchmark in value terms. If the standard were expressed exclusively in value terms, and if its margins were narrow, it would imply that the country would be undertaking *stabilizing* diversification. It would be rebalancing its portfolio in the direction of the currency that was losing relative value.

In principle, decisions on benchmarks and how they are expressed could be left to each individual country as long as there was a commitment to disclose the currency composition of the country's reserves in practice as well as in principle. However, participants in the International Reserve Diversification Standard might want to consult among themselves, potentially using the good offices of the Bank for International Settlements (BIS) or the IMF, about best practice and establish more precise guidelines than we have suggested.

Why might a large holder of foreign exchange reserves be willing to establish a published benchmark for the currency composition of its international reserves as part of its adherence to an International Reserve Diversification Standard? We advance three reasons.

First, the country would gain from the externalities generated by such a common enterprise. By its action, it would increase the probability that other countries would participate. The net effect would help to remove a source of volatility in foreign exchange markets and assist the country in managing its own holdings of foreign exchange reserves.

Second, the country would gain by enhancing its accountability vis-à-vis its own citizens. It stands to reason that most countries at least informally follow such benchmarks whether or not they are made public. A number of countries consider it to be best practice to publish those guidelines or benchmarks. Of course, publishing a benchmark does not enhance the government's accountability unless it also publishes information on how it follows that benchmark. Practices vary; see box 3 for details on practices in Australia and Canada. The IMF (2005b) reported that 7 of the 20 jurisdictions (industrial and nonindustrial) that participated in a set of case studies of reserve management practices disclosed their reserve management policy and performance both absolutely and relative to benchmarks.⁴⁷

Third, the publication of a benchmark or guideline serves to discipline the reserve manager. He is required to account for his actions, and the benchmark exerts a discipline on him in carrying out his fiduciary responsibility. Summers (2006) makes the case for international discussion and coordination of reserve investment decisions in the context of his proposal that the IMF and World Bank should think about creating a facility in which countries could invest their excess reserves, in effect in competition with the BIS. Our International Reserve Diversification Standard is a more modest proposal leaving greater

47. They were Australia, Canada, the Czech Republic, Hong Kong, Israel, New Zealand, and Norway.

Box 3 Reserve Management Benchmarks in Australia and Canada

Australia publishes an explicit benchmark portfolio for its net foreign-currency reserves: 45 percent in US dollars, 45 percent in euros, and 10 percent in Japanese yen. Australia's gross foreign reserves are substantially larger than its net reserves because the Reserve Bank of Australia engages in substantial swap transactions (spot purchases matched by forward sales of foreign exchange) to provide liquidity to its domestic financial market. It reports its reserve holdings under the reserves template of the SDDS on a gross basis including their currency composition; however, the currency composition of its net holdings is reported in the bank's annual report. Moreover, its benchmark for net holdings is expressed in value terms with discretion of only plus or minus 1 percentage point permitted to its reserve managers; thus, in its short-run reserve management, Australia acts as a *stabilizing* diversifier. Finally, Australia announces changes in its benchmark only ex post.

Australia gives priority to liquidity and security, and therefore investments are "confined largely to instruments issued by highly rated foreign governments, government agencies, and financial institutions" (Reserve Bank of Australia 2004). In addition, a duration, currently 30 months, is set for each segment of the Australian portfolio.

Canada is not quite as transparent. It does not publish an explicit benchmark for the currency composition of its international reserves, but the investment guidelines of the exchange fund account (EFA) administered by the finance ministry call for US\$15 billion (subject to an operating range) to be invested in US dollar assets, and the remainder to be invested in euro and/or yen. The key objectives of the EFA are to maintain a high standard of liquidity in US dollar assets, preserve capital value, and optimize return. The Currency Act of the Canadian Parliament governs the EFA, and it requires the minister of finance to report each year within five months of the end of the year on the EFA's operations the previous year. The 2004 report is 46 pages long (Canada Department of Finance 2005).

discretion with each country's authorities. However, Summers' rationale (2006, 12) applies equally to our proposal:

There are important risks for any central bank that attempts to go in this direction [of active management of its foreign exchange reserves]. It is likely to reap much more disfavor in years where investments go badly than favor when investments go well. And the opportunities for mischief in parking assets, in exercising control rights, in misvaluing assets are likely to be very large.

A public benchmark for the currency composition of a country's reserve holdings might limit those opportunities in one dimension. It would do so in more than one dimension if it were part of a broader framework of best practices in reserve management.

Why might a large holder of foreign exchange reserves be unwilling to establish a published benchmark for the currency composition of its international reserves as part of adherence to an International Reserve Diversification Standard?

Some countries may be reluctant to announce publicly such a benchmark. It should be noted that if they were willing to reveal the currency composition of their foreign exchange reserves on a regular

schedule, they in effect would be announcing information about their benchmarks ex post. Doing so without the prior provision of information about their benchmarks could result in the overinterpretation of changes in the actual composition of their reserves. Such countries as well as the international financial system as a whole would be better served with announced benchmarks as an alternative to offering ex post explanations.

Countries may believe that publishing a benchmark reduces their room to maneuver in managing its international reserves. However, we have argued that its room to maneuver is already sharply constrained by the absolute size of its foreign exchange holdings. The market is watching what the authorities are doing even before they do it. Thus, they are likely to be better off by saying what they will do and doing it. If the authorities are concerned about the market playing games in anticipation of future adjustments to conform to their benchmark, then this concern suggests the need for flexible guidelines and associated language about how those guidelines are applied.

Nevertheless, the authorities may feel that they need the room to maneuver to adjust the currency composition of their foreign exchange holdings without signaling their intentions in advance. In particular, they may be uncomfortable about providing the market with both a target in terms of currency shares and a sense of the pace of their portfolio adjustments. The authorities have an understandable reluctance to have private financial-market participants front-running their foreign exchange market operations. That is the reason why we have stressed that adjustments in actual reserve holdings should be gradual and have not suggested that countries should be constrained rigidly in their adjustments to their new benchmarks. Moreover, without at least an implicit commitment to gradual adjustment, the overall effect of the International Reserve Diversification Standard would provide much less assurance that its adoption would help to reduce unnecessary exchange market volatility.

General Comments

We propose that the 25 or 30 countries with large holdings of foreign exchange reserves voluntarily commit to greater disclosure about the currency composition of their reserves under an International Reserve Diversification Standard, which would augment commitments most of them have already made under the reserves template of the SDDS.⁴⁸ These countries as a group, working with the IMF and the BIS, would have to agree on the technical details about the enhanced disclosure, for example, currency coverage, treatment of off-balance sheet items, and periodicity of release. They would also have to agree on how to word their commitment to gradual adjustments in their holdings.

48. Other countries should be invited to participate, but participation by most of the 25-30 countries with large foreign holdings is crucial to the overall success of our proposal.

The IMF would be expected to monitor compliance with these agreements and inform the authorities, the markets, and the general public if countries are not living up to their commitments. The IMF, preferably in cooperation with the BIS and central banks, might also revisit the issues associated with best practices in reserve management as an adjunct to the International Reserve Diversification Standard, building on its prior work on guidelines for foreign-currency reserve management (IMF 2004 and 2005b).

The rollout of the standard would have to be carefully managed. It would be important not to contribute to an increase in short-term volatility in foreign exchange and other financial markets. For example, to the extent initial disclosure of the currency composition of some countries' foreign exchange reserves revealed discrepancies with market expectations, there could be short-term market reactions. Over the medium term as well, the market could react to periodic announcements. These considerations suggest that not only should the initial implementation of the International Reserve Diversification Standard be staged carefully but also there would be a premium on the continuous gradual adjustment of the currency composition of reserve holdings, which the standard is designed to facilitate.

One concern might be that the widespread adoption of an International Reserve Diversification Standard would risk politicizing discussions about reserve holdings. Domestically, the release of such information could lead to criticism and unwanted advice to policymakers about their benchmarks and decisions about reserve holdings. This is a standard concern about increased transparency about official actions and decisions. The experience of central banks, in particular, with increased transparency suggests those concerns are misplaced. One does not hear or read about expressions of regret by central bankers about their increased transparency or about efforts to roll back the changes that have occurred or that as a result of increased transparency their decision making has been subject to greater political interference. On the contrary, most thoughtful observers welcome the increase in accountability that greater transparency facilitates. If policymakers' decisions are controversial, they should be required to justify them rather than to hide them from public view.

With respect to international policy, it might be argued that increased transparency about the currency composition of a country's foreign exchange reserves along with a commitment to disclose explicitly or implicitly the benchmark for such holdings and to adjust gradually its reserve composition would deprive the country of a strategic weapon—one that should be kept secret. Such arguments might be heard from political commentators. They are unlikely to prove convincing to financial officials. It is in the interests of those latter officials to minimize the risk of disruptions to global financial markets because there is no assurance that their own countries could be insulated from the adverse effects. From this perspective, widespread adherence to an International Reserve Diversification Standard should be a welcome contribution to global financial stability.

CONCLUSION

Many perceive the diversification of the currency composition of large reserve holdings as a potential threat to international financial stability and a source of substantial financial-market volatility. We have argued that concerns about the effects of actual or rumored reserve diversification on financial markets, while potentially substantial, are generally exaggerated. The available evidence suggests that the amount of *active* diversification of countries' foreign exchange reserves has been limited to date.

Nevertheless, the concerns have some substance, and we have put forward the case for an International Reserve Diversification Standard that would increase transparency and accountability with respect to countries' reserve holdings and limit the effects on financial-market volatility of the process of reserve diversification. Our standard contains two components: (1) routine disclosure of the currency composition of official foreign exchange holdings and (2) a commitment by each adherent to adjust gradually the actual currency composition of its reserves to any new benchmark for those holdings.

We have demonstrated that it would be feasible to structure such a standard based upon existing precedents and practice. We have argued that the case favoring collective action in this area outweighs the case against doing so. We have illustrated some of the concerns that might arise in developing and implementing such a standard, but we think that they can and should be overcome.

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Table 1 Top 30 holders of foreign exchange reserves

Rank	Country	Amount (billions of US dollars)		Percent share of world total, 2005	Percent share of GDP, 2005	Change, 2001–05 (percent)	Share of world change, 2001–05 (percent)
		2001	2005				
1	Japan	388	847	20.3	18	118	21.7
2	China	212	819	19.6	43	286	28.6
3	Taiwan	122	253	6.1	76	105	6.0
4	Korea	102	210	5.0	26	105	5.1
5	Russia	33	176	4.2	23	440	6.8
6	India	45	137	3.3	18	189	4.0
7	Hong Kong	111	124	3.0	72	12	0.6
8	Singapore	75	115	2.8	101	56	2.0
9	Malaysia	30	71	1.7	53	138	1.9
10	Mexico	44	69	1.6	9	55	1.1
11	Algeria	18	56	1.3	52	202	1.7
12	Brazil	36	54	1.3	7	51	0.9
13	Thailand	32	51	1.2	30	56	0.9
14	Turkey	19	50	1.1	14	155	1.4
15	Norway	22	46	1.1	16	108	1.1
16	Australia	16	41	1.0	6	149	1.2
17	Poland	25	41	1.0	14	61	0.7
18	Germany	44	40	1.0	1	–9	–0.2
19	Libya	14	38	0.9	90	171	1.1
20	United States	29	38	0.9	0.3	30	0.4
21	European Central Bank	37	38	0.9	n.a.	3	0.1
22	United Kingdom	32	37	0.9	2	17	0.3
23	Switzerland	30	35	0.8	10	17	0.2
24	Indonesia	27	33	0.8	11	16	0.2
25	Denmark	16	33	0.8	13	94	0.7
26	Canada	30	31	0.7	3	1	0.0
27	Czech Republic	14	29	0.7	24	104	0.7
28	Israel	23	28	0.7	23	21	0.2
29	France	26	24	0.6	1	–3	0.0
30	Venezuela	9	23	0.6	18	166	0.7
<i>Memorandum:</i>							
	Industrial countries (25)	788	1,261	30	4	60	22
	East /South /Southeast						
	Asia (17)	780	1,787	43	36	129	48
	Eastern Europe (18)	129	361	9	10	180	11
	Western Hemisphere (32)	97	171	4	7	76	3
	Middle East and North						
	Africa (16)	133	221	5	20	66	4
	Africa (49)	36	78	2	13	117	2
	Fuel exporters (16)	234	567	14	18	142	16
	OPEC (9)	117	238	6	20	103	6
	Non-OPEC (7)	117	328	8	16	180	10
	World total (IFS)	2,052	4,171	100	10	103	100

n.a. = not applicable; OPEC = Organization of the Petroleum Exporting Countries

Sources: IMF's *International Financial Statistics* (foreign exchange reserves) and *World Economic Outlook* (GDP).

Table 2 Change in the US dollar reserve shares during periods of dollar depreciation and appreciation

Period	Change in US dollar (percent)	Changes in share of reserves (percentage points)	
		Quantity	Value
Depreciations ^a			
1976–78	-13.5	0.3	-6.2
1985–88	-33.8	7.3	-5.9
1990–91	-7.9	1.9	-0.2
1994–95	-4.7	4.4	0.1
2002–04	-25.2	2.0	-5.6
Average	-17.0	3.2	-3.6
Appreciations ^b			
1980–84	39.0	-13.9	-0.5
1992–93	8.5	3.4	5.8
1996–97	16.4	2.3	6.1
2000–2001 ^c	16.3	-2.4	0.4
Average	20.0	-2.6	3.0

- a. A period of depreciation is defined as two consecutive years of negative year-to-year changes in the Federal Reserve Board staff's major currencies trade-weighted real US dollar index.
- b. A period of appreciation is defined as two consecutive years of positive year-to-year changes in the Federal Reserve Board staff's major currencies trade-weighted real US dollar index.
- c. 1999 to 2001 was one period of continuous appreciation, but 1999 was excluded here due to the break in the quantity and value reserves series in that year.

Sources: Federal Reserve Board (dollar); International Monetary Fund (quantity and value shares).

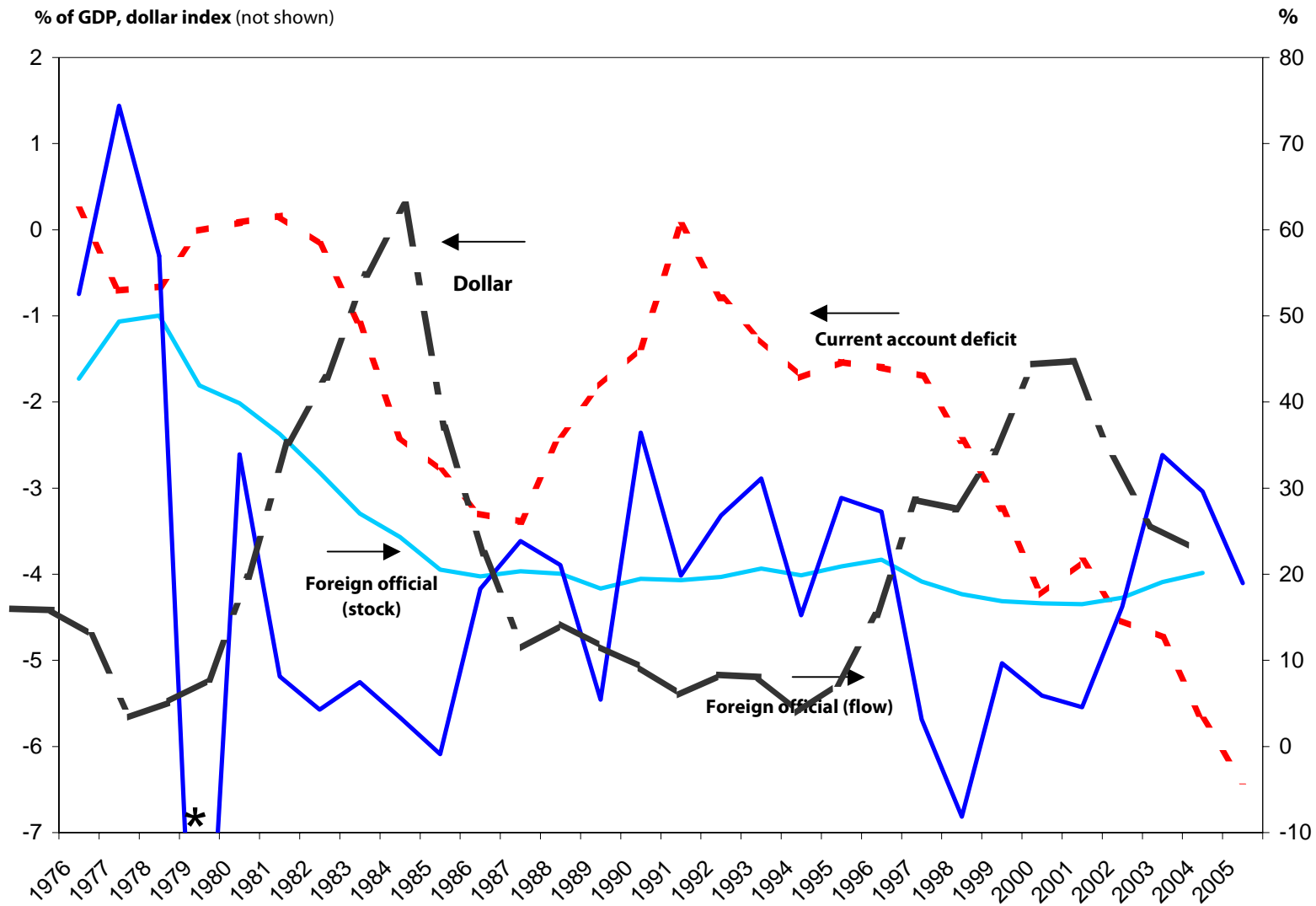
Table 3 Currency composition of foreign exchange, 2000–2004 (percent)

Country	Foreign exchange reserves as of 2005 (billions of US dollars)	US dollar		Euro		Yen		Other currencies	
		Share, 2004	Change, 2000–2004	Share, 2004	Change, 2000–2004	Share, 2004	Change, 2000–2004	Share, 2004	Change, 2000–2004
Hong Kong ^a	124	79	11	11	-1	2	-2	9	-8
Norway	46	35	14	43	-3	6	-6	16	-4
Australia	41	45	5	45	15	10	-20	0	0
United Kingdom	41	30	-6	55	17	15	-12	0	0
Germany	40	98	-1	0	0	2	1	0	0
United States	38	0	0	57	10	43	-10	0	0
Switzerland	35	34	-7	48	3	0	-3	19	7
Canada ^b	31	48	-27	49	27	4	0	0	0
Romania	20	36	-37	59	35	0	0	5	2
Philippines	16	83	-9	10	8	4	-1	4	2
Slovak Republic	15	22	0	78	3	0	-3	0	0
Colombia	14	85	5	12	-3	3	-1	0	0
Finland	10	30	0	0	0	5	-10	65	10
Croatia	9	16	-10	84	14	0	0	0	-4
Bulgaria	8	6	-4	91	3	0	0	3	2
Slovenia	8	12	-9	83	11	0	0	4	-2
New Zealand	9	57	4	43	26	0	-31	1	1
Lithuania	4	0	-80	100	85	0	-1	0	-1
Latvia	2	38	-16	59	26	3	-2	0	-9
Subtotal	507	50	-6	36	12	7	-5	7	-1
Sweden ^c	21	37	n.a.	37	n.a.	8	n.a.	18	n.a.
Uruguay ^d	3	82	n.a.	11	n.a.	4	n.a.	3	n.a.
Iceland ^e	1	40	n.a.	40	n.a.	5	n.a.	15	n.a.
Grand total	533	50	n.a.	36	n.a.	7	n.a.	8	n.a.
<i>Memorandum:</i>									
Peru ^e	13	90	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

- a. Since 2003, the Hong Kong Monetary Authority has grouped yen, euro, and other European currencies altogether into one category as "non-US dollar bloc." The 2003–04 yen and euro shares in this table are derived by assuming that they remain the same as in 2002 in the "non-US dollar bloc," which has decreased as a share of the total since that time.
- b. Canada holds only three currencies as foreign exchange reserves: US dollar, yen, and euro. Prior to 2003, data published by Canada's ministry of finance only differentiate between US dollar and non-US dollar foreign exchange reserves. Hence, to derive the yen and euro shares for 2000–2002, we assume that the yen share during the period was the same as it was in 2003, and the rising euro share was derived as a residual.
- c. Data are available only for 2004.
- d. Earliest data available are for August 2003.
- e. Earliest data available are for July 2002, but only differentiate between the US dollar and other currencies (yen, euro, pound, and Canadian dollar).

Sources: Central bank annual reports (Bulgaria, Colombia, Finland, Germany, Hong Kong, Iceland, Lithuania, New Zealand, Norway, Peru, Philippines, and Romania); Ministry of Finance Annual Report (Canada); central bank Web site (Sweden); IMF SDDS Reserves Template Webpages (Latvia, Croatia, and Uruguay); monthly statistical bulletin on central bank or ministry of finance Web site (United States, United Kingdom, Switzerland, Australia, Slovak Republic, and Peru).


Figure 1 Foreign official share of US foreign financial inflows, 1976–2005

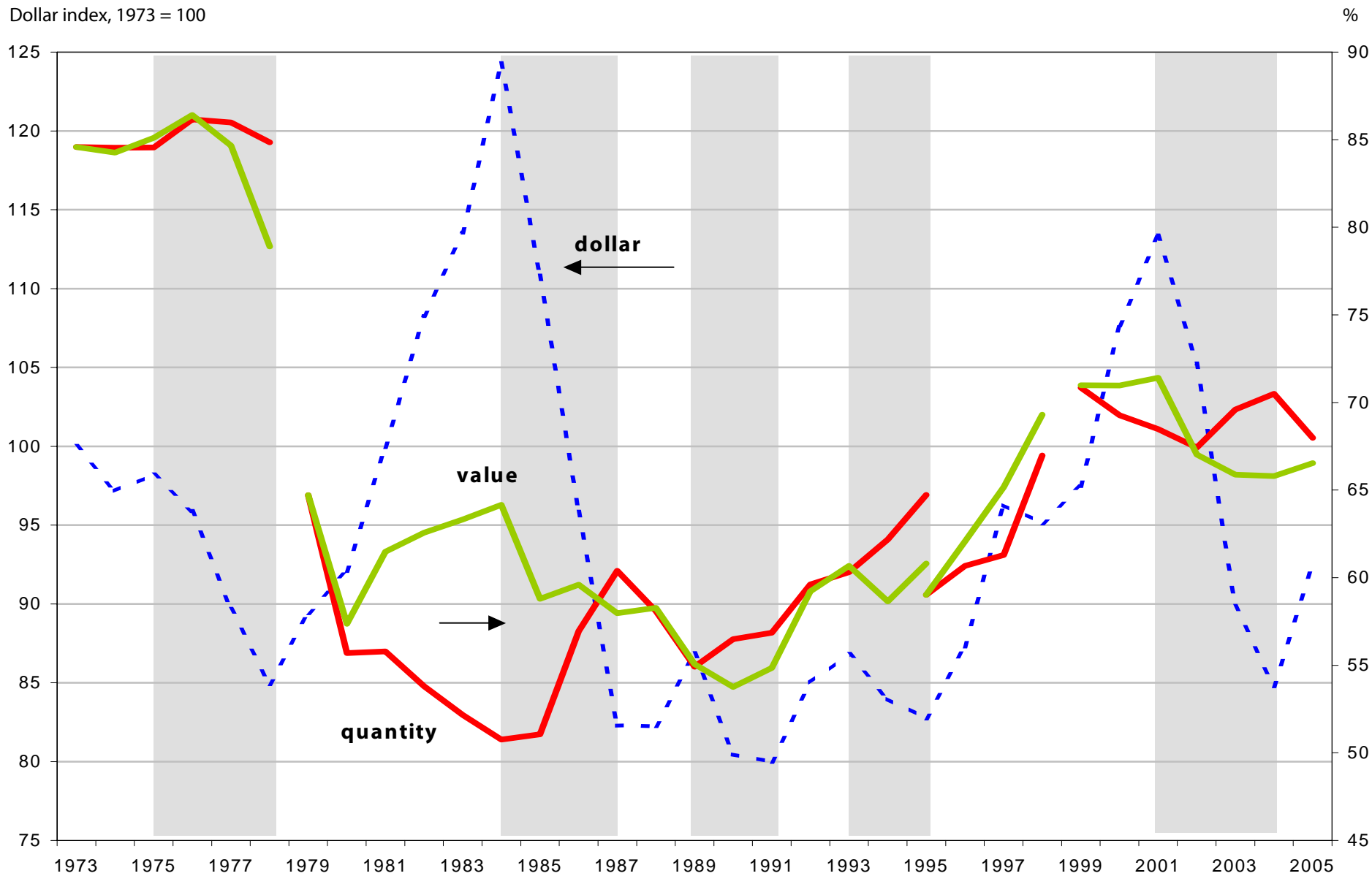


* = Foreign official (flow) share in 1979 is -47.

Sources: Bureau of Economic Analysis (current account deficit, foreign official flow and stock); Federal Reserve Board (dollar)

Figure 2 US dollar's share of foreign exchange reserves, 1973–2005Q4

 = dollar depreciation



Source: Data from 1973 to 1995 are taken from table I.3 in the latest IMF Annual Report, which publishes information for a given year. Data since 1995 are taken from the IMF Composition of Foreign Exchange Reserves (COFER) database.