

CENTRALIZED RESERVE POOLING FOR THE ASEAN PLUS THREE (APT) COUNTRIES

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1. Introduction

Reserve adequacy reemerged as an issue of more general interest during the 1990s and early 2000 as a series of currency crises afflicted emerging economies such as Argentina, Brazil, Indonesia, Republic of Korea (Korea), Malaysia, Mexico, Russia, and Thailand.¹ Rapid reserve depletion became a principal facet of currency crises, and reserve levels *ex ante* showed up as a significant variable in studies examining the predictability of crises.² Fischer (2001b) nicely summarizes the importance of reserves in the era of capital mobility as follows:

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

This paper is organized around four main sections. The first briefly explores the connection between reserve adequacy and currency crises in light of recent country experiences and empirical research. Section 2 examines recent data on reserve accumulation in the Association of Southeast Asian Nations (ASEAN) plus three (APT) countries i.e., ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore and Thailand) plus the People's Republic of China (PRC), Japan, and Korea).³ Section 3 explores, in some detail, the specific gains to be reaped if the regional economies were to pool their reserves. Section 4 discusses the modalities and institutional arrangements that need to be in place if a centralized reserve pool is to be made operational and managed effectively. The final section offers a few concluding remarks. An annex that outlines a general cost-benefit framework determining the optimal reserve holdings follows the main text.

¹ The interest in the issue of reserve adequacy diminished markedly following the collapse of the Bretton Woods system.

² For instance, see Bussière and Mulder (1999), ul Haque et al. (1996), and Disyatat (2001).

³ Due to the lack of complete data series for the rest of the ASEAN members (Brunei, Cambodia, Laos,

2. The Rationale for Holding Reserves

International reserves are basically a buffer stock held against the uncertain future course of the balance of payments. Owned reserves represent a guaranteed and unconditional source of liquidity.

Reserves-to-Imports Ratio

Where balance-of-payments instability stems from the current account, it seems appropriate to assess the adequacy of reserves against some measure of trade flows like the value of imports. Accordingly, the reserves-to-imports (R/M) ratio became the standard way of quantifying reserve adequacy though its theoretical foundations were always weak (Bird and Rajan 2003). Triffin (1947) is generally thought of as being among the first to systematically argue that the demand for reserves might be expected to grow in line with trade, and hence the R/M ratio is a good measure of reserve adequacy.

One of the first attempts to formalize the demand for reserves is by Heller (1966). Heller developed a simplified but intuitive model that showed optimal reserves to be an increasing function of uncertainty [average yearly imbalances (h)] and a decreasing function of the cost of holding reserves (r_n) and of the marginal propensity to import [a proxy for the reciprocal of the marginal cost of balance-of-payments adjustment (A) as $A=1/m$]. The Heller model has subsequently been modified and extended by a number of authors.

An important paradox to note is that the Heller model assumes that reserve holdings are inversely related to the *marginal propensity to import*, while the Triffin hypothesis suggests that reserves are positively related to *average propensity to import*. Despite this theoretical ambiguity, the import cover ratio has been highly popular. For instance, IMF has regularly presented data about reserve levels in this way in the *World Economic Outlook*. A rule-of-thumb emerged: that reserves were insufficient if they

Myanmar and Vietnam), we can only include the major five ASEAN economies in this study.

covered less than about 3-4 months' worth of imports (Fischer 2001b; also see Reddy 2002).

Reserve Adequacy and the Capital Account⁴

As noted, the crises of the 1990s and beyond that afflicted many middle-income developing countries have predominantly been crises of the capital account. Reserve adequacy benchmarks accordingly need to be modified to allow for capital outflows as well as for imports to be a potential drain on reserves (Bird and Rajan 2002a, Fischer 2001b, Rajan 2002b, and Reddy 2002). In view of this capital account nature of crises, two conceptual weaknesses associated with reserve adequacy need to be highlighted.

First, the adequacy of reserves can only be legitimately viewed in the context of a package of policies. Drawing down of reserves is one way of responding to a current account balance-of-payments deficit. Alternative options are in terms of both external *financing* and economic *adjustment* (Bird and Rajan 2002a). Thus, a specific level of reserves may be inadequate in a situation where there are no other sources of financing and there is a reluctance or inability to correct a current account deficit, but at the same time adequate when alternative sources of financing exist or adjustment can be quickly attained. It follows that to examine the adequacy of reserves in "partial" terms and in isolation is of limited value. Thus, Fischer (2001b) recently noted IMF's surveillance policies:

We are focusing more on those policy areas that can leave a country vulnerable to crises. The management of reserves is one. Others include macroeconomic policies, exchange rate regimes, financial sector soundness, and debt management (p. 2).

Second, with regard to currency crises, is it not possible that any level of reserves that international capital markets, and nationals who are in a position to engage in capital flight, perceived as being inadequate will turn out to be so? Once investors lose confidence in a currency and the government is unable to restore it, reserves will tend to

⁴ This section draws on Bird and Rajan (2003).

rapidly dissipate in the face of rapid capital outflows. The rate of depletion is then likely to increase as the level of reserves declines, since declining reserve levels will further erode confidence.⁵ Where reserves are no longer adequate to cover short-term external liabilities, the loss of confidence may become complete.

In the aftermath of the East Asian crisis, the extent of short-term indebtedness has been found to be a key indicator of illiquidity and a robust predictor of financial crises.⁶ According to Dadush et al. (2000), and on the basis of data for 33 developing economies, the elasticity of short-term debt with respect to gross domestic product (GDP) growth is 0.9 when there is a positive shock and -1.8 when there is a negative shock. The extreme reversibility of short-term debt in the event of negative shock exposes borrowers to liquidity runs and systemic crises.⁷ In view of the importance of short-term external debt, proposals have been made to express a country's reserves (R) in relation to its short-term external debt (STED).

The idea of using the R/STED ratio is actually not new. There have been some earlier formal explorations of this issue by Ben-Bassat and Gottlieb (1992) and Jung (1995) who hypothesize that reserves are held to avoid default costs (i.e., reserves are postulated to be a function of debt that is coming due). The R/STED ratio has recently been popularized by former Deputy Minister of Finance of Argentina, Pablo Guidotti, who proposed that countries should manage their external assets and liabilities in such a way as to be capable of living without foreign borrowing for up to one year (De Beaufort Wijnholds and Kapteyn 2001). This implies, at a minimum, that *usable* foreign exchange reserves should exceed scheduled external amortization for one year. However, this "external balance sheet rule" measure implies that there is a discrete distinction between reserve adequacy and reserve inadequacy. Other criticisms have been made of the

⁵ This is particularly so if, as Aizenman and Marion (2002) suggest, countries with high discount rates, political instability, or political corruption are generally the ones that hold lower reserve levels. In other words, a country that loses reserves rapidly may be concerned that it will be deemed to share the characteristics of the other low reserve countries, i.e., "guilty by association" by fickle investors.

⁶ See Bussière and Mulder (1999), Dadush et al. (2000), Rodrik and Velasco (1999), and World Bank (2000).

⁷ In a somewhat contrarian view, Jeanne (2000) argues that it is not clear that short-term debt contracts ought to be discouraged as they may play a socially advantageous function in reducing agency problems.

R/STED ratio, suggesting that while it gives an indication of the vulnerability to an “external drain,” it fails to capture the threat of an “internal drain” associated with capital flight by residents (De Beaufort Wijnholds and Kapteyn 2001). The latter may be best captured by measures of broad money supply (M2) (also see Flood and Marion 2001). A low and declining reserves-to-M2 ratio, which captures the extent to which liabilities of the banking system are backed by international reserves, is among the leading indicators of a currency crisis (Kaminsky and Reinhart 1999).

The R/STED and R/M2 ratios are improvements over the conventional R/M ratio in an era of intensified capital mobility. Nonetheless, these capital account-based ratios fail to reflect the dynamics of currency crises. Thus, in addition to monitoring the level of reserves in relation to some scaling factor like STED, an attempt should also be made to keep an eye on the change in reserves as well as its rate of change. How rapidly are reserves falling and how quickly will threshold ratios be reached? Since rapid reserve loss signals the need for a change in policy, the indicator needs to be designed in a way that allows sufficient time for the policy changes to be implemented and to take effect.

It is in this spirit that Alan Greenspan, chairman of the Federal Reserve Board of the United States, offered two enhancements to the “Guidotti-rule” (Greenspan 1999). The first of these would be to have an additional rule that the average maturity of a country’s external liabilities should exceed a certain threshold, such as 3 years. The second enhancement is to have a “liquidity-at-risk” standard. Under this standard, a country’s external liability position would be calculated over a wide range of possible outcomes, taking into account the full set of external assets and liabilities. An appropriate level of reserves would then be the one that provides a high probability that external liquidity will be sufficient to avoid new borrowing for 1 year (say 95%). This methodology is broadly similar to the value-at-risk methodology used by commercial banks (De Beaufort Wijnholds and Kapteyn 2001 and Reddy 2002) and increasingly used by central banks. For instance, the Reserve Bank of India states:

The World Bank (1999) surveys recent literature on short-term debt and financial crises.

with the changing profile of capital flows, the traditional approach of assessing reserve adequacy in terms of import cover has been broadened to include a number of parameters which take into account the size, composition, and risk profiles of various types of capital flows as well as the types of external shocks to which the economy is vulnerable (Reddy 2002, p. 6).

3. Reserve Accumulation in East Asia Post-Crisis

What Do the Data Tell Us?

Stockpiling of reserves by the East Asian economies in the early 1990s helped somewhat cushion the exchange rate depreciations in 1997–1998. Also important is the fact that the regional economies began re-accumulating international reserve holdings following the sharp declines in 1997 (so-called floating with a life jacket), implying that the current account surpluses exceeded total capital outflows.⁸ The regional economies have, as a group, been replenishing and accumulating international reserves (partly reflected also by the rising percentage of the reserves in the overall GDPs of the countries between 1998 and 2001). Consequently, the two factors combined (falling imports and rising reserves) led to a jump in the average number of monthly imports that the foreign exchange reserves cover for all these economies during the post crisis from the precrisis levels (Table 1). Korea and the PRC stand out as having accumulated reserves aggressively between 1992 and 2001. The replenishment and accumulation of international reserves, on the one hand, and the lengthening of the average maturity profile of external indebtedness of the regional economies (Table 2), on the other, have significantly improved the external positions of the regional economies. The region's vulnerability to the destabilizing effects of volatile and easily reversible capital flows has consequently been substantially eased.

The preceding highlights a seeming paradox. The regional economies (save for Hong Kong, China; and Malaysia) have generally allowed for a relatively greater, albeit modest, degree of variability of their currencies according to market conditions (Hernandez and Montiel 2001, and Rajan et al. 2002). Yet the central banks in

developing countries have appeared keen on bolstering reserves to historically high levels.⁹ A policy of reserve accumulation has clearly been embraced by East Asia, which has the world's largest holdings of foreign reserves in aggregate. To emphasize this point, global international reserves stood at \$2,223 billion in May 2002, a near doubling in nominal terms since early 1994. Developing countries hold around two thirds of the world's international reserves, with East Asia alone holding 38% of the global share in May 2002, up from 30.5% in 1994 (Aizenman and Marion 2002).

Costs of Holding Reserves

An important drawback of accumulating international reserves is that it involves high fiscal costs as the country effectively swaps high-yielding domestic assets for lower yielding foreign ones.^{10, 11} This said, the revealed preference of East Asian countries to accumulate reserves well beyond levels that would be deemed adequate by the rules-of-thumb ratios discussed in the preceding section despite the high fiscal costs need not necessarily imply irrational behavior (see Appendix 1)¹². Indeed, the seeming insatiable appetite of central banks for international reserves is an age-old fact. In what became known as "Mrs Machlup's Wardrobe Theory," Machlup (1966) suggested that the acquisitive characteristics of monetary authorities in terms of adding to their reserves resembled those of his wife in terms of clothes. He argued that monetary authorities essentially looked to maximize their reserves. As such, the demand for reserves in any period could, according to Machlup, be characterized simply as being equal to the level

⁸ Another reason for the accumulation of reserves is the "fear of floating" that seems to characterize developing countries (Calvo and Reinhart 2000, Hausmann et al. 2000 and Rajan 2001b).

⁹ Of course, the impact of exchange rate variability on reserve holdings runs both ways. On the one hand, with flexible regimes, the exchange rate acts as a safety valve in response to balance-of-payments disequilibria. On the other hand, past exchange rate changes may be an indication of the extent of variability of and susceptibility to external shocks. Insofar as central banks need to hold reserves to counter these external shocks, this suggests the need to hold larger quantities of reserves.

¹⁰ Conversely, reserve holdings confer a benefit to nations that supply the reserve currency as they effectively obtain low interest loans (with no currency risk).

¹¹ Strictly speaking, since the opportunity costs of holding reserves are the real investments (capital imports) forgone, we ought to be using the difference between the marginal product of capital (MPK) and the yield on foreign interest rates on liquid assets.

¹² There is an older strand of literature that takes a so-called "social welfare utility-maximizing approach" to determining optimal reserve holdings. As this literature emphasizes, differences between the central banks' preferences can be explained by differing specifications of the utility function (Gandolfo 1995).

of reserves in the previous period plus some growth factor no matter what the level of imports or any other underlying economic variable.

Certainly, we cannot say with any certainty that countries are holding “excessive” reserves in the absence of a clear understanding of the major determinants of reserve holdings, which themselves may evolve over time. For instance, in a recent cross-country study on the determinants of foreign reserve holdings spanning the period 1981–1995, Lane and Burke (2001) estimate a reserve demand equation. They find that (i) the more open a country is to trade flows, (ii) the greater the country’s financial depth (proxied by M2-to-reserves ratio), (iii) the smaller the country and the more volatile its export revenue growth, and (iv) the lower its indebtedness, the greater the reserve holdings (measured as a ratio of reserves to GDP). Interestingly they find that once external debt is controlled for, the maturity structure of debt does not appear to influence the size of reserve holdings. However, the authors find a negative correlation between external debt and reserve holdings. This offers some vindication of the oft-noted critique that highly indebted countries would be better-off paying off some of that debt. As the *Economist* (September 23–29, 2000) put it, “it is rather as though a household with lots of cash sitting idle in a low-interest bank account was at the same time paying a much higher interest rate on its debt. It would make more sense to repay some of that debt” (p. 90).

In a recent paper, Aizenman and Marion (2002) estimate the following reserve equation using a panel for 122 developing countries over the period 1980–1996:

$$\ln(R_{it}/P_{it}) = \alpha_0 + \alpha_1 \ln(pop_{it}) + \alpha_2 \ln(gpc_{it}) + \alpha_3 \ln(exa_{it}) + \alpha_4 \ln(imy_{it}) + \alpha_5 \ln(neer_{it}) + \varepsilon_t$$

where R is actual holdings of reserves minus gold (millions of US dollars deflated by the US GDP deflator, P); pop is the total population of the country; gpc is real GDP per capita; exa is the volatility of real export receipts; imy is the share of imports of goods

and services in GDP; and *neer* is the volatility of the nominal effective exchange rate.

The authors explain the choice of dependent variables as follows:

Real reserve holdings should increase with the size of international transactions, so we would expect reserve holdings to be positively correlated with the country's population and standard of living. Reserve holdings should increase with the volatility of international receipts and payments if they are intended to help cushion the economy, so we would expect reserve holdings to be positively correlated with the volatility of a country's export receipts. Reserve holdings should also increase with the vulnerability to external shocks. We therefore expect reserve holdings to be positively correlated with the average propensity to import, a measure of the economy's openness and vulnerability to external shocks. Finally, since greater exchange-rate flexibility should reduce the demand for reserves because central banks no longer need a large reserve stockpile to manage a fixed exchange rate, reserve holdings should be negatively correlated with exchange-rate volatility (p. 6).

In the case of East Asia, in-sample results largely confirm the authors' priors. Indeed, if anything, the estimated reserve equations systematically overpredicted reserve holdings. However, out-of-sample results for the crisis period in East Asia in 1997–1999 reveal a systematic underprediction of reserves in most of the East Asian countries (save Malaysia). Incorporation of political variables does not alter these conclusions. Thus, the authors conclude that “behavior has changed since the Asian financial crisis” and go on to suggest that the “recent build-up of large international reserve holdings in a number of Asian emerging markets may represent precautionary holdings” (p. 11).

Indeed, continued reserve accumulation by the East Asian economies implies more generally that, at the margin, the benefits of extra reserves are perceived as exceeding the costs. There may be a political premium on avoiding future crises and retaining the option of a slower speed of adjustment should the balance of payments weaken and external assistance is found wanting.¹³ In other words, costs of holding reserves may be considered an insurance premium (“precautionary motive”).¹⁴ But is

¹³ In response to the limitations of the multilateral response to capital account crises, IMF established contingent credit lines (CCLs). This new facility has not exactly proven to be an outstanding success (see Rajan, 2003a).

¹⁴ Apart from conditional access to global capital markets discussed in the section Reserve Adequacy and the Capital Account, Aizenman and Marion (2002) also suggest that this precautionary motive may arise from costly domestic tax collection and inelastic fiscal liabilities.

there any way in which the liquidity yield from holding reserves may be generated without the need for individual countries to continue to accumulate them? One way might be for regional economies to pool their reserves and enjoy the benefits of economies of scale from so doing. But how might one judge the potential size of benefits of reserve pooling? Before this can be done, we first need to estimate the level of reserves that members would have to hold independently relative to pooling reserves (i.e., “hypothetical reserves”). Or, in other words, we need some measure of the extent of “excess reserves” that are generated with pooling of reserves.

4. Assessing the Size and Benefits of a Reserve Pool

Reserve-to-Imports Ratio Revisited

One rather crude yet useful yardstick might be based on the following reasoning. Assume that reserve pooling is undertaken as part of a larger policy of economic integration, which includes trade integration.¹⁵ In such a case, a large part of intra-regional trade that was originally considered to be external, will no longer be so. Insofar as the R/M ratio is considered a reasonable - albeit imperfect - yardstick of reserve adequacy, the “disappearance” of a large chunk of external trade will now imply that the region will be holding a substantial pool of “excess reserves.”¹⁶ In the case of East Asia, how much would this excess be?

Kawai and Takagi (2000) estimate that around 40% of ASEAN-10 imports are from ASEAN countries themselves and the Japanese market during the period 1990–1998. Furthermore, about 55% of the imports of the APT economies as well as Hong Kong, China; and Taipei, China originated from the same group of economies.

To ascertain the gains from reserve pooling, we first calculate the foreign exchange reserve to imports ratio for the overall group.

¹⁵ See later discussion of reserve pooling in the presence of regional exchange rate coordination.

¹⁶ This was one of the questions asked during the advent of the euro.

$$Ratio = \frac{\sum_i R_i}{\sum_i M_i} \quad (1)$$

where: R_i is the average monthly level of reserve held by the group during a specified period of time and M_i is the average monthly level of imports of the group. Therefore, *Ratio* is equivalent to the numbers of months of imports that can be covered by the monthly foreign exchange reserves that the group holds within the period.

If reserve pooling among the East Asian economies is part of a larger goal of trade integration, the arrangement implies that no foreign exchange reserves are needed to cover the imports of a member country originating from other member countries of the same group. Consequently, the same average level of individual country reserve holdings should amount to a corresponding higher monthly import coverage. This may be formally stated as follows:

$$Ratiopol = \frac{\sum_i R_i}{\sum_i (M_i - s.M_i)} \quad (2)$$

where s is the share of total imports that originate from the economies within the group. The closer s is to one, the greater the extent of “integration” among the member economies, and the larger the *Ratiopol*.

Having determined *Ratiopol*, we are able to compute the “hypothetical” reserve level from pooling. To be sure, we define the “hypothetical reserve level” as *the level of total foreign exchange reserve that the nonpooling group would have to hold to have the same months of import coverage that it would have under the pooling arrangement.*

$$HR = Ratiopol * \sum_i M_i \quad (3)$$

The average excess gain from joining the groups is

$$ER = HR - \sum_i Ri \quad (4)$$

where ER is the excess reserve level, HR is the hypothetical reserve level, and $\sum_i Ri$ is the actual average foreign exchange reserve level held by the group during the specified period.

Tables 3 and 4 report the two sets of findings covering the period 1990–1998. The first group includes the ASEAN-5 economies plus Japan; the second is for the ASEAN-5 plus Hong Kong, China, Japan, People’s Republic of China, and Korea.¹⁷ The results suggest that the s equals 0.4 for the first group and 0.55 for the second. The (*Ratiopol*) is 68% and 122% more than the corresponding (*Ratio*). Consequently, the “excess” reserves from pooling is around \$176 billion for the group of ASEAN-5 and Japan, and around \$507 billion for the ASEAN-5 plus Hong Kong, China, Japan, People’s Republic of China, and Korea. Considering the high fiscal costs of reserves, this suggests significant savings from reserve pooling.

Variability of Reserves: Coverage Index

While the preceding measure of excess reserves is certainly intuitive, there are at least two problems with it. One, we have already noted the limitations of using imports as a scaling factor for determining reserve adequacy. Two, the foregoing implicitly assumes that reserve pooling is done in tandem with intensified trade integration.¹⁸ While the issue of trade versus monetary regionalism in an era of intensified capital flows is an important one that has been explored elsewhere (Bird and Rajan 2002b), what if the region does

¹⁷ The selection of the countries in each group is dictated by the information available from Kawai and Takagi (2000). As noted, data constraints require analysis be limited to the largest five ASEAN members.

¹⁸ Peter Montiel notes (in private correspondence) that the reserve-import ratio is “not really conditional on

not form a free (preferential) trade bloc?¹⁹ Is there some way of gauging the amount of “excess reserves” independent of any assumptions regarding regional trade integration?

Since international reserve holdings have been found to be a theoretically and statistically significant determinant of creditworthiness (Bussière and Mulder 1999, ul Haque 1996 and Disyatat 2001), depleting them as a way of cushioning the effect of capital outflows on the exchange rate may make matters worse by inducing further capital outflows. If capital outflows reflect a perception within private capital markets that a country is illiquid, reducing international reserves—and therefore curbing liquidity further in a financially fragile environment—is unlikely to be an effective strategy. In other words, the reversibility that makes reserve depletion credible in the context of trade deficits is often absent in the context of capital outflows (Bird and Rajan 2003). As noted by Reddy (2002):

There is a tendency among the analysts and media to react negatively to erosion in a more intensive way and positively to addition to reserves in a less intensive way. A higher level of reserves may possibly give greater scope for changes by making them appear marginal (p.10).

In view of the foregoing, there seems to be sound rationale to minimize the degree of variability of reserve holdings. How is this related to a reserve pool? Medhora (1992b) observes:

By belonging to the reserve pool, the member countries have...access to the others' reserve during times of need. At the same time, by pooling, each country is taking on the variability of the entire pool, rather than just the variability of its own reserves (p. 213).

Coverage Index: It has long been argued that one of the more appropriate measurements of the foreign exchange reserve adequacy level is to consider the reserve coverage as the ratio of reserves holding to their variability (Dodsworth 1978, Medhora 1992a, b and Williams et al. 2001). This formulation encompasses the two potential

reserve pooling being adopted in conjunction with regional trade initiatives. After all, the calculations could be performed for any level of intraregional trade.”

¹⁹ This is an important point as while ASEAN and the PRC are planning to form a Free Trade Agreement (FTA) over the next decade or so, Japan and Korea are not (yet) part of this policy initiative (Rajan, 2003b).

sources of gains in reserve pooling, viz., an increase in average reserve holdings (or access to reserves) and a decrease in its variability.

We define coverage in country i as

$$C_i = \frac{PR}{Var(PR)} \quad (5)$$

where PR is the average level of reserve holdings (or access to reserves) during a time period, and $Var(PR)$ is their variability during the same period.²⁰ In the case of a reserve pool, $PR = \sum R_i$ is the average level of reserve held by each member of the pool.

Each individual country may also consider a partial pool, whereby each can access all its own reserves as well as the partially pooled reserves of all the other members. The coverage index for the partial pool is computed as follows:

$$C_i = \frac{R_i + \sum_{j \neq i} p.R_j}{Var \left[R_i + \sum_{j \neq i} p.R_j \right]} \quad (6)$$

where p is the degree of pooling ($0 < p < 1$), and R_i and R_j are the total reserves of country i and country j (the members of the pool).

From Equations 5 and 6, it is clear that the coverage under reserve pooling will be higher than that in the autonomous state if the variability of the pool is lower than that of each country's reserves separately, or if the increased access to the larger pool of reserves outweighs the higher variability of the pooled reserves. The formulation of the pooled-coverage index assumes that each country has unrestricted access to the pool. When one country draws down the pool, it reduces coverage for the other member countries. Hence, the pool system is clearly a zero sum game. The gains and losses

²⁰ Variability of PR is represented by the standard deviation of the reserve during a specified time period.

from pooling can be quantified by examining the hypothetical scenario of “what if each country had wanted to maintain the level of coverage that it actually enjoyed, but did not belong to the pool” (Medhora 1992b, p. 217).

The hypothetical reserve is calculated using the following equation.

$$HR_i = C_i * Var(R_i) \quad (7)$$

where HR_i is the hypothetical reserve—the level of reserves that each country would have to hold if it did not belong to the pool, but still wanted to maintain the coverage actually afforded by the pool. C_i is the coverage index of country i under the pooling, and $Var(R_i)$ is the variability of country i own reserves. The gains/losses from reserve pooling may be measured as follows:

$$G/L = HR - AR \quad (8)$$

where (G/L) is the gain (+) or loss (-) in foreign exchange reserve level, and HR and AR are the hypothetical and actual average foreign exchange reserves.

We divide our observation set (of the foreign exchange reserves minus gold) into pre- and post-1997. The precrisis period covers Q1 1991 to Q4 1996; the post-1997 period spans Q1 1998 to Q1 2002. For each observation set, we compute the coverage index without pooling (0%), with 50% pooling, and with 100% pooling. For the two pooling sets, we separately estimate the coverage index for (i) the ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand) only; (ii) the ASEAN-5 with Korea, the PRC; and Japan; and (iii) the ASEAN-5 with Korea; the PRC; Japan; and Hong Kong, China (the reason for including Hong Kong, China will be apparent below).

For the precrisis period, the 50% pool coverage indices are in general higher than those for the 100% pooling (Tables 5-7). Within the ASEAN-5 group, all the members

except Indonesia would have benefited the most by committing their reserves to 50% pooling. When we add Korea, the PRC, and Japan to the ASEAN-5 economies, only the Philippines and the PRC appear to benefit from the pooling arrangement. These results should be expected as the individual coverage index without pooling for Korea, the PRC, and Japan was lower than the average coverage index of the ASEAN-5. When Hong Kong, China is added to the pooling, we find all countries considered, other than Hong Kong, China and Indonesia, would have benefited from the 50% pooling arrangement. Note that the pooled coverage indices for the ASEAN-5 economies are at the highest when Hong Kong, China is part of the pool.

As for the postcrisis period, the benefit of pooling for ASEAN-5 is less conclusive (Tables 8-10). When we consider only the ASEAN-5 pool, Thailand and Singapore—the two economies with the largest stock of foreign exchange reserves at the end of 2001—do not appear to benefit from the arrangement (Table 8). Inclusion of the PRC, Korea, and Japan would actually worsen the pooled coverage indices for all the ASEAN-5 (Table 9). In the case of North Asia, only Korea and Japan would improve their reserve positions with pooling. A broadly similar overall conclusion arises when Hong Kong, China is invited to be part of the pool (Table 10). Thus, contrary to what some may say, the computation reveals that the advantages from reserve pooling are not “self-evident.”

The decline in the benefits of pooling after the crisis vis-a-vis before the crisis can be largely explained by both significant increases in the average reserve levels as well as the sharp declines in the variability of the reserves after the crisis relative to the precrisis levels (Table 11). All the ASEAN-5 economies experienced a sharp increase in reserves averaging around 67% growth after crisis. During the same period, the variability of reserves declined substantially, except for Indonesia, which reported substantially higher reserve variability. As for the North Asian economies, their international reserves increased in terms of both magnitude and variability (except for the PRC). However, the individual coverage index for Korea; the PRC; Hong Kong, China;

and Japan appreciated after the crisis because of the more than proportional increase in the actual average reserve holding.

Given that there do not appear to be any conclusive benefits for the ASEAN-5 from the pooling with the rest of the key economies in East Asia during the postcrisis period using the coverage ratio method, we do not compute hypothetical reserves during that period. However, for the precrisis case, Table 12 reports the gain in reserves from a 50% pool involving the ASEAN-5 (except Indonesia) and the PRC, Korea, and Japan.²¹ Among the ASEAN countries, the gain in reserves from 50% pooling is estimated to be 40% for Thailand and Singapore, and around 80% for Malaysia and the Philippines, of the total average reserve of each country without pooling. As for the North Asian economies, the gain in reserves for the PRC, Korea, and Japan ranges from 60% to about 120%.

Caveats Regarding the Use of the Coverage Ratio²²

The coverage ratio used above is among the first formal attempts to quantify the costs/benefits of regional reserve pooling. This said, the use of the coverage ratio as a measure of assessing adequacy of reserve holdings is not without its limitations. Key among the drawbacks is the fact that the coverage ratio is probably a more appropriate measure of benefits from diversification—as in the case of Latin America, for instance (see the section Creating a Centralized Pooling Arrangement below). Reserve pooling in the Asian context is largely focused on the “insurance motive,” i.e., access to a liquidity pool at times of “extreme” events in international capital markets. In relation to this, the very presence of a large liquidity pool of reserves may reduce the probability of a crisis. In other words, as noted by Peter Montiel, “the distribution of exchange market pressure that...(a country)...potentially faces...may be endogenous to the existence of a regional

²¹ Note that we stick to 50% pool as that appears to offer superior results compared with a 100% pool.

²² This subsection was motivated by useful comments from Peter Montiel.

pool.”²³ This, along with the analysis in the previous sections, emphasizes that there is a strong case for reserve pooling.

At the very least, the coverage ratio index suggests that there are greater benefits to be had from *partial* as opposed to *complete* pooling (a point noted again in the section Reserve Pooling versus Exchange Rate Coordination below). The case for partial as opposed to complete pooling is especially strong if one considers the fact that all measures of reserve pooling are subject to the criticism that they overstate the extent to which pooling economizes on reserve holdings as they do not account for the fact that pooled reserves are only available with conditionality. (The issue of conditionality is discussed in the next two sections.)

5. Institutional Arrangements and Modalities for a Centralized Pool

The Chiang-Mai Initiative

The preceding discussion has emphasized that, from a simple cost-benefit calculus perspective, there is a strong rationale for East Asian economies to consider establishing some sort of reserve pooling mechanism, particularly in view of the regional character of financial crises. But how should they proceed?

A natural starting point would be the Chiang Mai Initiative (CMI), which is essentially a network of bilateral currency swaps and repurchase agreements as a “firewall” against future financial crises. In broad terms, the CMI is aimed at providing countries facing the possibility of a liquidity shortage with additional short-term hard currencies. While the CMI is undoubtedly an important first step toward intensified monetary cooperation, on its own and given the manner in which it is presently structured, its effectiveness is questionable. It is, after all, still an uncoordinated and decentralized swap arrangement.

An important next step would therefore be to reinforce and augment the existing bilateral currency swap arrangements under the CMI if it is to be made a credible and

²³ Comments made in private correspondence.

effective financing mechanism. The size of the currency swap, though large compared with some countries' IMF quotas (Henning 2002), remains small in absolute terms. To be sure, the total amount of bilateral swap arrangements (BSAs) covering all 13 East Asian countries is currently estimated at around \$20 billion, with the maximum amount of money that any individual country can draw varying significantly. Nonetheless, the \$20 billion that is available in aggregate is comparable with the \$17.2 billion that was granted to Thailand itself as part of the IMF program of 1997–1998. If the aim of liquidity arrangements is to ensure the availability of large-scale liquidity in crisis periods, the current size and manner in which the CMI is structured preclude its playing the role satisfactorily. Henning (2002), Park (2001), and Wang (2003) offer comprehensive descriptions of the CMI and offer useful suggestions on how it may be built upon while still maintaining its credit line character.

Creating a Centralized Pooling Arrangement: The Latin American and West African Experiences

Going forward, if the CMI is to be built upon as a way of providing short-term liquidity at the regional level, it would be natural to think about extending the facility to establish a full-fledged regional reserve pooling mechanism or liquidity support program (Henning 2002). Indeed, if the hitherto decentralized and bilateral swap arrangements are activated collectively, the CMI will go a long way to becoming a de facto regional pooling arrangement. More to the point, a regional standing reserve pool essentially involves participating central banks being able to access a portion of their regional partners' foreign reserves during times of distress.

Many Asian governments have hitherto been unwilling to consider restructuring the CMI to create a more formalized regional structure. This should not come as a surprise. Regional reserve pooling has by no means been an easy issue in practice. Consider the case of Europe. Despite the establishment of a single regional central bank, the federal structure of the union and very different levels of reserves held by

individual countries (central banks) implied that pooling of reserves was done only partially. For similar reasons, and particularly since East Asia does not yet have strong, centralized institutions, the case for *partial* as opposed to *full* reserve pooling is especially strong. The empirical analysis discussed in an earlier section further enforces this conclusion.

The fact that the Asian economies maintain about 50% of the world's foreign exchange reserves suggests that (a) there is a definite case of resource misallocation, with huge opportunity costs as highlighted previously; and (b) the region has sufficient aggregate reserves to develop a large and credible common reserve pool arrangement. More importantly, the reserves are well distributed between many "strong-currency" countries including Japan, the PRC, Korea, and Singapore. This is important because if a region on balance had relatively more "weak-currency countries" than "strong ones," sustainability—if not creation of a common reserve pool—would certainly come into question. It would be highly unlikely that the few strong currency countries would be willing to allow their reserves to be constantly compromised by the weak-currency countries. Conversely, if reserves are well-spread out among a number of strong-currency countries, these countries will be able to work together to require the weak-currency ones to implement necessary macroeconomic and structural reforms if they are eligible to draw upon the common pool when needed. (The issue of conditionality and other prerequisites are discussed later).

Latin American Experience

Member countries with somewhat smaller reserves or limited technical capacities may stand to gain further by participating in a centralized reserve pooling mechanism as their capital contributions might be more efficiently managed (in the sense of obtaining higher returns for the same or lower levels of risk). For instance, countries participating in the Latin American Reserve Fund (FLAR) appear to benefit in such a manner from a centralization of part of their individual reserves. The FLAR, which is a financial and

monetary institution of the member countries, evolved from the Andean Reserve Fund (which operated between 1978 and 1991) with a current membership comprising Bolivia, Colombia, Ecuador, Peru, and Venezuela. The FLAR also offers participating member central banks an opportunity to invest their noncommitted international reserves with the regional institution so as to benefit from its investment expertise.

The experience of the FLAR is also important for another reason. Given the relatively small size of individual reserve holdings as well as the fact that most of FLAR's members are best classified as being weak-currency countries, the institution has been relatively ineffective in acting as a credible stabilizing mechanism against financial instability and may actually have been a source of additional financial contagion. Indeed, FLAR's role in offering its members international liquidity assistance during periods of stress has been highly limited. For instance, Ecuador received a loan of just about \$400 million, while Colombia received \$125 million in 1999. These were paltry amounts compared with what the crisis countries actually needed. It is generally agreed that if the FLAR is to be made more effective as a regional financing facility, it ought to be expanded to include advanced member countries, particularly strong-currency ones.

West African Experience

The experience of the West African Economic and Monetary Union (WAEMU) is also of some relevance here. The WAEMU, established in 1994, consists of eight countries: Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The WAEMU has a common central bank (BCEAO) and shares some other institutions. The WAEMU and the Central African Economic and Monetary Community (CAEMC) together comprise the CFA franc zone (Williams et al. [2001] discuss the institutional arrangements of these institutions). By and large all the economies in the WAEMU might be considered weak-currency ones. However, the French Treasury guarantees the reserve pool available in the CFA franc zone (i.e., augments the pool if and when needed). This ensures a degree of credibility of the regional financing facilities.

Reserve Pooling versus Exchange Rate Coordination: The European and West African Experiences

If the CMI does evolve into a regional liquidity facility, it would be natural to ask whether effective financial cooperation can be pursued in the absence of regional exchange rate coordination. Certainly, any explicit form of exchange rate coordination necessitates that a reserve pooling arrangement be in place to jointly manage the regional currency arrangement. But such a strong form of coordination requires much more. Uppermost on the list is the need for close coordination of regional macroeconomic policies, which in turn almost inevitably requires some sort of constraining arrangement to ensure compliance. It would, however, be fair to say that the regional countries in Asia do not currently have the consensus or political will necessary to consider establishing a coordinated exchange rate regime in the near future (Eichengreen and Bayoumi 1999). Indeed, small but strong-currency countries like Singapore are unlikely to be willing to forsake the discretion they have over their own macro policy and subordinate themselves to a regional monetary alliance that is untested and where their voice may not be significant. On the other hand, a reserve pooling arrangement requires no such binding constraint on their decision making until and unless they need to draw on the common pool. A reserve pooling arrangement also offers benefits on its own. Therefore, it can be pursued regardless of any decision pertaining to explicit regional exchange rate coordination.

The European Experience

This being said, over time, if a greater degree of exchange rate coordination—in the form of common regional basket pegs or even a collective exchange rate regime or an Asian monetary system (equivalent to the European Monetary System or EMS)—becomes more practicable, there will be a need to further strengthen the centralized monetary pool (Kusukawa 1999). Indeed, as envisaged by Williamson (1999), there may be a need to put in place an equivalent to the European very short-term financing facility (VSTFF) to sustain the regional currency arrangement in the event of speculative attacks. To be

sure, under the VSTFF, central banks granted one another loans of unlimited amounts for 45 days to 90 days. Interest would be paid at prevailing market rates and up to 50% could be repaid in European Currency Unit (ECU) (Henning 2002). This facility was under the control of the former European Monetary Cooperation Fund (EMCF), which was financed by US dollar deposits of each member state's reserves, and the EMCF issued ECU in return.²⁴ The EMCF board - which is composed of governors of participating national central banks - was established to scrutinize European monetary policies, administer the operation of credit facilities, and authorize exchange rate realignments. Apart from the VSTFF, the other financial facilities under the purview of the EMCF were the Short-Term Monetary Support (STMS), which was meant for temporary balance-of-payments problems (loans of 3-9 months), and the Medium-Term Financial Assistance (MTFA), which was financed through assigned lending quotas for individual central banks with loans for 2-5 years, subject to remedial macroeconomic conditionality.

An important element of the EMS was the creation of the ECU, which was to function as the region's unit of account. Official ECUs were issued to member central banks through the EMCF in exchange for 20% of their US dollar and gold reserves. The EMCF was dissolved following the formation of the European Monetary Institute (EMI) in January 1994.²⁵ The EMI took over the tasks of the EMCF while additionally being tasked with strengthening central bank cooperation and monetary policy coordination as well as assisting with the preparations needed to establish the European System of Central Banks (ESCB). The EMI itself was liquidated with the establishment of the European Central Bank (ECB) in June 1998. Following the dissolution of the ECU with the creation of the euro in 1998, the reserves held by the ECB were transferred back to the regional central banks.

²⁴ The EMS, set up in 1979, consisted of four main components: the European currency unit (ECU), the exchange rate mechanism (ERM), the financial support mechanism (FSM), and the European Monetary Cooperation Fund (EMCF). The EMCF itself was established in 1973 following the Werner Report and after the creation of the "snake in the tunnel."

²⁵ All said, the EMCF possessed little authority in practice, as the regional central bank authorities were unwilling to forsake their macroeconomic autonomy, and its role was largely subordinated by the Council of Ministers of Economics and Finance (ECOFIN).

More generally, as with the EMS, there needs to be an explicit agreement that regional financing arrangements and interventions will need to be rapidly disbursed, automatic, and unlimited. A plausible argument could be made that if speculators are intent on attacking a currency arrangement, no level of reserves will be sufficient to counter the attack. However, in the presence of strong fundamentals, the availability of a large standing pool of reserves ought to bolster confidence and reduce the probability of an attack in the first instance. Indeed, as noted previously, it is instructive that international reserves (appropriately scaled) consistently shows up as a leading indicator of currency crises.²⁶

Insofar as greater exchange rate coordination facilitates intraregional over extraregional trade, the optimal size of reserve holdings of the region may decline as domestic trade replaces external trade.²⁷ In addition to this reduced transactions demand for reserves, the absence of the need to stabilize the intraregional exchange rates with exchange rate coordination also suggests a lower precautionary need for reserves.²⁸ With regard to the precautionary demand for reserves, there is a more subtle issue to note. Countries hold reserves as a war chest against adverse geopolitical developments and other “non-market considerations” (Reddy 2002). To the extent that closer monetary integration enhances intraregional security and reduces some of these intraregional geopolitical considerations, the region’s aggregate demand for reserves can be expected to decline.

The West African Experience

The potentially greater benefits from a reserve pooling mechanism, if it is (eventually) couched within a monetary union, have been highlighted by the experience of the

²⁶ This said, during the days of the EMS, many Western European countries imposed restrictions on capital flows. This imposition may have facilitated the sustainability of the regime, particularly as international capital flows were much less intense since the mid-1990s.

²⁷ Frankel and Rose (2001), Glick and Rose (2001), and Rose (2000) estimate gravity models using both cross-sectional and time series data and conclude that a common currency is especially trade-stimulating intraregionally.

²⁸ Offsetting these effects, with a full-fledged currency union, there will be an automatic decline in “international reserves” with the redefinition of regional currencies. However, this is of less relevance for

WAEMU. Computations of the coverage ratio illustrated that not all countries benefit equally from a pooling of reserves. The same is true of the WAEMU. However, referring to the WAEMU, Medhora (1992b) concludes:

Pooling has not benefited all members equally...(However)...the evidence of asymmetry in the gains (and, indeed the existence of losses from some countries) could be viewed as a sign that the system is working. The very basis of belonging to a reserve pool, or, for that matter, the monetary union, is to provide benefits to others in the knowledge that at other times, they will do the same for you...Belonging to a monetary union involves buying a package so that gains or losses in one aspect of the deal must be seen in the larger context of the arrangement...The lesson for other(s)...contemplating such an arrangement...is that reserve pooling works best when couched among other features of regional monetary integration.

While the foregoing certainly ought not to be construed to imply that reserve pooling in Asia cannot succeed without closer exchange rate coordination, it is important to be aware of the limitations of “partial” monetary cooperation.

Surveillance and Policy Conditionality

In the absence of exchange rate coordination, there is the perennial concern that the incentives for participating countries may be blunted. Specifically, some member countries may be less concerned about maintaining unsustainable currency regimes as there may be the expectation of the availability of large-scale regional financial assistance in the event of a speculative attack. Thus, even if there is no explicit exchange rate coordination, there is a need to have in place an effective monitoring and surveillance mechanism such that all participating countries can exercise some degree of influence on one another's policies and, in particular, highlight or rein in profligate policies. In other words, for a centralized reserve pooling mechanism to operate effectively, it is imperative that an appropriate mechanism be in place to monitor participating countries' policies and compliance with automatic agreed upon sanctions in place to deal with noncompliance (i.e., conditionality).²⁹

Asia (compared with Europe, for instance) as the US dollar is the most important reserve asset in Asia.
²⁹ The trade-off between automaticity of liquidity availability, on the one hand, and that of ensuring the conditionality is met, on the other, is an issue in need of much more in-depth discussion.

The need to ensure “due diligence” in all likelihood necessitates the establishment of a small, permanent, but technically capable secretariat, or a monitoring and surveillance institution to coordinate activities/actions and monitor regional and global economic developments, and promote regional policy dialogue.³⁰ The IMF would be expected to be involved in such regional surveillance (most likely with observer status). However, such regional surveillance is expected to be conducted independently of that done by the IMF, not unlike the Organisation for Economic Co-operation and Development (OECD)-based surveillance.

Dieter (2000) has noted:

The provision of a public regional liquidity fund ought to be accompanied by two monitoring bodies, a regional monetary committee and a regional banking supervision system. Committing foreign reserves of a country's central bank, even if it is limited to a certain percentage, is not a simple bookkeeper's exercise, but a genuine expression of confidence. In order to further build this mutual trust, the regional monetary committee is of vital importance. Central bankers could meet frequently, e.g. monthly, to discuss developments in the financial sector and in foreign exchange markets. Although in the proposed structure of level 1 the fixing of exchange rates is not envisaged, the regional monetary committee could prepare this step. The establishment of a regional monetary committee would also contribute to the creation of “intra-regional policy networks”, which enable policy makers to deepen their knowledge of their partners in the region.

Without the possibility that an independent surveillance unit will impose a policy conditionality on borrowing countries, it is unlikely and inadvisable to institute a reserve pooling arrangement, as this could give rise to all sorts of moral hazard problems on the side of the borrower, which may promote permissive behavior. Indeed, any arrangement that has weak conditionality and enforcement will not be seen as credible by the markets

³⁰ In this regard, a natural starting point may be to extend the ASEAN Surveillance Process (ASP) to encompass the North Asian countries. This has already been done with the inclusion of the PRC, Japan, and Korea. A major limitation of the ASP as it is currently structured is that there are no fact-finding missions as with the IMF. Participating governments (finance ministry and central bank officials) offer information to the ASP directly. Thus, to a large extent, the effectiveness of regional surveillance is still highly limited. If the regional pooling arrangement is put in place and operates with a little more independence from IMF, there may be a need to substantially strengthen regional surveillance. Whether member countries are willing and able to move beyond the current peer review process to more formally engage each other and confront/be ready to be confronted in the event of profligate policies is unclear. Henning (2002) offers a useful discussion on how surveillance among the APT countries might be strengthened.

and is therefore not sustainable. In other words, it may go bankrupt or significantly weaken financially as the strong-currency countries may chose to opt out.

In the case of an Asian liquidity facility, it would be premature to discuss here the exact type of conditionality or surveillance system that ought to be involved, or the enforcement mechanisms and operating procedures that need to be put in place. Nonetheless, given that the issue of conditionality is highly important, we briefly note here the experience of the FLAR.

The FLAR has provided short- and medium-term financial assistance to crisis-hit member countries. In particular, members can avail themselves of a number of types of loans: loans and guarantees to support balance of payments, liquidity loans, and emergency loans.³¹ The FLAR has maintained its own conditionality, which is, by and large, weaker than that of IMF (each type of conditionality comes with slightly different conditionality). Nonetheless, despite its limited size, and a membership consisting largely of relatively “weak-currency” countries, the FLAR has never experienced any difficulty in recovering its loans. Thus, as long as policy discipline in lending is in place, it is unlikely that the regional Asian facility will go bankrupt.

Nexus Between Monetary Regionalism and IMF³²

So, would a new Asian financial architecture based perhaps on a regional liquidity facility fund threaten or facilitate international financial stability? Would regional reform be a stepping-stone or a stumbling block to international monetary reform? It could be a stumbling block if loans from the regional facility carried conditionality that was inconsistent with that coming from IMF. Moreover, the attitude among advanced economies that Asia is looking after its own problems could reduce the urgency with which reform at the international level is pursued. It is therefore important to identify

³¹ In addition, the FLAR offers members loans to support public external debt restructuring and also has an export finance facility.

³² This section is based on Bird and Rajan (2002a).

the comparative advantages of regional and international financial institutions and the division of labor between them (Bird and Rajan 2002a).

Boughton (1997) has reminded us that “although the intention was that the availability of the Fund’s resources should prevent countries from experiencing financial crisis, in practice, the institution has often found itself helping its members cope with crises after they occur” (p.3). Monetary and financial regionalism, as discussed in this paper, could help the IMF fulfill its stated aim; it is consistent with the principle of “subsidiarity.” Why choose to deal with a problem at the global level when it can be handled adequately and perhaps more effectively at the regional level? Just as multilateral trade liberalization and multilateral trade institutions have been joined by an increasing array of regional trading arrangements, regional financial crises may be better handled by regional arrangements. To the extent that regional arrangements may help reinvigorate interests in strengthening the international financial architecture, they could act as stepping stones toward multilateral reforms rather than stumbling blocks (Park [2001] makes a largely similar argument). Regional arrangements ought to promote greater commitment to, and national ownership of, programs and conditionality, a point that is universally recognized as highly important.

Things could be organized along the following lines. On the basis of work done by the Basel Committee, a regional liquidity facility could stipulate financial standards appropriate in an Asian context. Asian countries could commit themselves to achieve these standards over a specified time frame. Being on course in terms of meeting them could then be a necessary precondition for financial support from the regional facility in the event of contagion from a regional crisis. Beyond the need for the crisis-country to pursue “non-profligate” macroeconomic policies, loans from the regional facility would carry nothing equivalent to IMF structural conditionality and would be available only on a short-term basis, and at a high interest rate to help deal with potential moral hazard

problems.³³ The very existence of additional short-term liquidity could reduce the incidence of speculation and crisis. Countries with fundamental and longer-term economic problems would still have to turn to the IMF, where they would be exposed to IMF conditionality (discussed further below).

By providing an extra incentive for members to reform their domestic financial systems—a process, as noted earlier, that may not yet have gone far enough—a regional monetary facility could help prevent future crises. By providing an additional source of short-term liquidity, it could take financial pressure off IMF during crisis periods. Elaborating on the issue, Park (2001) notes:

There is also the argument that regional financial management could be structured and managed to be complementary to the role of the IMF. For example, an East Asian regional fund could provide additional resources to the IMF while joining forces to work on matters related to the prevention and management of financial crises. An East Asian monetary fund could also support the work of the IMF by monitoring economic developments in the region and taking part in the IMF's global surveillance activities. The East Asian monetary fund could also be designed initially as a regional lender of the last resort while the IMF assumes the role of prescribing macroeconomic policies to the member countries of the East Asian monetary fund (p. 6).

Beyond cooperation in surveillance, the regional facility could work closely with IMF to develop mechanisms appropriate for Asia to involve the private sector in crisis resolution, and promote “constructive engagement” and constant dialogue among creditors and debtors. In this way a regional facility could contribute to enhanced international financial stability.³⁴

For all the foregoing reasons, an efficient, regionally based cooperative arrangement for providing liquidity would be consistent with the central elements of the new international financial architecture. It is still possible to think *globally* and to act

³³ This recommendation is in sharp contrast to the manner in which the CMI is currently structured, where 90% of the potential drawings under the CMI are contingent on the debtor country having an ongoing IMF program (Henning 2002). Of course, the assumption here is that an effective regional surveillance mechanism is in place.

³⁴ Henning (2002) has suggested a particular division of labor, whereby the APT countries provide intraregional financing while IMF supports the region's surveillance and provides conditionality.

regionally.³⁵ The IMF would continue to stand ready to assist economies where regional arrangements failed to resolve problems, but, in this event, it might be more reasonable to assume that these problems did not have to do exclusively with shortages of liquidity, and this would raise the credibility of IMF conditionality³⁶.

In other words, the first two “ports of call” in the event of a crisis would be own reserves as well as pooled reserves from the regional monetary facility. IMF funds would be *additional* to these, but ought to be available on a “stand-by” basis so that markets are clear as to the large size of aggregate reserves available to the countries. In such a case, the obvious question that follows is how would the IMF conditionality relate to regional conditionality? While far greater attention needs to be given to this complex issue than can be offered here, it seems important to sub-divide IMF lending into those pertaining to liquidity-based assistance (*a la* CCLs) on the one hand, and structural adjustment measures on the other. In the first instance, IMF assistance ought to be available via the CCL-type liquidity facility, in which case, macro and financial conditionality presumably ought to be broadly similar to, or consistent with, those devised by the regional facility.³⁷ In cases where liquidity assistance (both regional and multilateral based) is found to be insufficient, and the problems faced by the country are considered far “graver,” the “conventional” IMF structural conditionality would be appropriate—though in this case there is an ongoing and unresolved debate as to what exactly constitutes “appropriate” Fund conditionality (IMF-IEO 2002).

7. Summary and Concluding Remarks

With memories of crises still reasonably fresh, it is perhaps unsurprising that the East Asian countries have exhibited a desire to stockpile reserves to finance international

³⁵ Needless to say that, in addition to these regional and multilateral liquidity pools, countries are expected to maintain sound debt and reserve management policies to minimize the chances and costs of disorderly exits.

³⁶ As Fischer (2001a) has noted, there are two primary objectives of Fund conditionality, viz “to ensure that IMF resources are used to promote economic reform and adjustment, rather than to postpone it; and to ensure that the borrower is able to repay the loan on the agreed terms, making the resources available to other members who may need them.”

³⁷ This is unlike the current situation where IMF liquidity-based conditionality is determined almost

transactions, meet unexpected difficulties in the balance of payments, and, most importantly, serve as an insurance or a “war chest” against future crises. However, an important limitation of such a reserve-hoarding policy is that it carries large implicit fiscal costs as the country effectively swaps high-yielding domestic assets for lower yielding foreign ones. In view of these high costs, some prominent economists have gone so far as to suggest that developing countries rethink the policy of openness to capital flows (other than those related to foreign direct investment) (Rodrik 2000).

Assuming, however, that countries do want to optimize subject to a relatively open capital account, is there any way in which the liquidity yield from holding reserves may be generated without the need for individual countries to continue to accumulate them? Indeed, if capital outflows reflect a perception within private capital markets that a country is illiquid, reducing international reserves—and therefore curbing liquidity further—is hardly likely to be an effective strategy. Therefore, countries will do well to look beyond domestic reserve management to buttress their international liquidity positions if they are to effectively protect themselves from the vagaries of international capital markets. This is where the question of a reserve pooling arrangement comes up. The exploratory empirical analysis in this paper suggests that there are indeed significant economic gains to be had from partial reserve pooling.

Thus, as envisaged in this paper, both from a systemic and individual country perspective, it may be desirable to have “tiers of liquidity” (or concentric defense lines). The top tier would be owned reserves. From a government’s perception, an advantage associated with international reserves is that they may be used quickly and without conditions. The second tier would be regional liquidity arrangements. This tier can be further subdivided into utilization of the country’s own reserves placed with the regional pool and other members’ reserves with the pool. This recommendation is consistent with the WAEMU, whereby:

unilaterally by the Bretton Woods institution.

each central bank is obliged to maintain 65% of its official reserves in the operations account. In the first instance, each country draws down on its own account of pooled and unpooled reserves. Once these are fully drawn down, the other countries' pooled reserves may be used. In essence, there is no statutory limit on a member country's use of reserves. A crisis management scheme takes over when...(aggregate)...reserves fall below the prescribed threshold, not when the reserves of individual countries are exhausted" (Williams et al. 2001, p. 7).

The third tier would be conventional IMF lending which ought to be subdivided into CCL/liquidity-based lending and more conventional structural-adjustment-based lending. In the case of the former, it would be appropriate for the conditionality linked to liquidity-based lending to be closely aligned with financial and macro conditionality determined by the regional monetary facility (in conjunction with IMF). All in all, with such a tiered structure, the degree of liquidity could be inversely related to the degree of conditionality.³⁸

The CMI is a major policy initiative taken by the member countries to fortify regional defenses against the vagaries of international capital markets. Beyond enhancement of the existing levels of swap arrangements, the next logical step would be to consider establishing a full-fledged reserve pooling facility. The potential upside gains of an arrangement of this type have been discussed and shown to be significant in some instances.³⁹ What is more, the benefit of reserve pooling is likely to rise substantially when the pool arrangement is undertaken as part of a larger monetary and trade integration.

Undoubtedly, a significant degree of effort and political will by regional countries is needed to create the conditions necessary to ensure that such a facility will function effectively. An important precondition for the regional financial facility to operate effectively (and independent of IMF) is that there *must* be a considerable strengthening

³⁸ See Chaipravat (2002) for a proposal for a common decentralized reserve pooling mechanism whereby each member country deposits two fifths of its total reserves with member central banks. Each country would be able to draw a multiple of the amount deposited inter-regionally. These drawings would be contingent on a set of conditions to be determined by an autonomous surveillance unit. Unlike the foregoing suggestion of tiers of liquidity, Chaipravat envisages that the reserves would be additional to the resources provided by IMF in the context of a Fund financial program.

³⁹ Other benefits of an effective regional liquidity facility, such as having a regional voice on international monetary affairs, are certainly important but not discussed here. See Henning (2002), Bird and Rajan (2002a), Chang and Rajan (2001), and Rajan (2001, 2003a).

of the regional surveillance mechanism with well-worked-out policy conditionality. While reserve pooling does not automatically imply the need for exchange rate coordination (which is a much stricter form of cooperation), the policy conditionality will invariably have to address, in some manner, the issue of exchange rate arrangements pursued by the participating member countries. For instance, if it is accepted that some exchange regimes such as soft pegs are inherently more crisis prone than others, there could be a requirement that policy conditionality be tighter in circumstances where countries are known to operate such a regime.

Beyond the immediate tasks of offering liquidity assistance and cooperating more closely to protect themselves from risks arising from capital account volatility, as with the case of the FLAR, the early Western European facilities (EMCF and EMI), and the monetary initiatives involving Caribbean countries, the broader aim of such a regional facility ought to be to support a move by the region toward much closer monetary and economic coordination.

Appendix 1

Cost-Benefit Calculus Determining Optimal Reserve Holdings

Reserves are held because they act as a buffer against external shocks. However, stockpiling reserves has a significant opportunity cost. We briefly outline here a simple theory of the demand for international reserves based on a cost-benefit calculus (Bird 1995).

In Figure A1, the bottom-right quadrant illustrates a negative relationship between the quantity of reserves held and the speed and size of adjustment. In other words, the less the amount of reserves held, the greater the speed and size of adjustment needed to adjust to a balance-of-payments shock. The bottom-left quadrant describes a positive association between the speed of adjustment to a balance-of-payment shock and the variability of income. In particular, the greater the adjustment, the more variable is the income. Both quadrants hold regardless of whether adjustment involves expenditure-reducing or expenditure-switching policies. The top left quadrant reveals a negative nexus between (expected) income levels and the amount of reserves held. This is essentially a representation of the opportunity costs of holding reserves, i.e., the larger the reserves held, the lower the amount of capital investment that may be undertaken.¹ Putting these three quadrants together derives the top-right quadrant, which shows a positive association between expected income levels and the variability of income. Thus, other things being equal, the greater the demand for reserves, the slower the speed of adjustment and the lower the variability of income, though this benefit comes at a cost of lower income levels.

The demand for reserves will be determined at the point of tangency between the central bank's indifference curve (IC_A) and the curve showing the trade-off

¹ Of course, to the extent that reserve holdings are seen as a sign of strength, a larger level of reserves may encourage greater capital inflows. We ignore this possible complementary effect.

between expected income and variability of income (point A). Note that the more risk averse the central bank is, the more steeply sloped the indifference curve (IC_B) and therefore the greater the desired reserve holdings (point B).

The above framework is essentially a generalization and graphic representation of the buffer stock model developed by Frenkel and Jovanovic (1981). Under certain assumptions, Frenkel and Jovanovic derive the optimal reserve holdings to be as follows:

$$R_0 = (c\sigma/r^{0.5})^{1/2} \quad (\text{A.1})$$

where R_0 = desired reserves, c = country-specific nominal constant, σ = standard deviation of reserve movements, and r = opportunity cost of holding reserves. Equation A.1 reveals that the desired reserve holdings is a positive function of volatility and negative function of the opportunity costs of maintaining reserves.

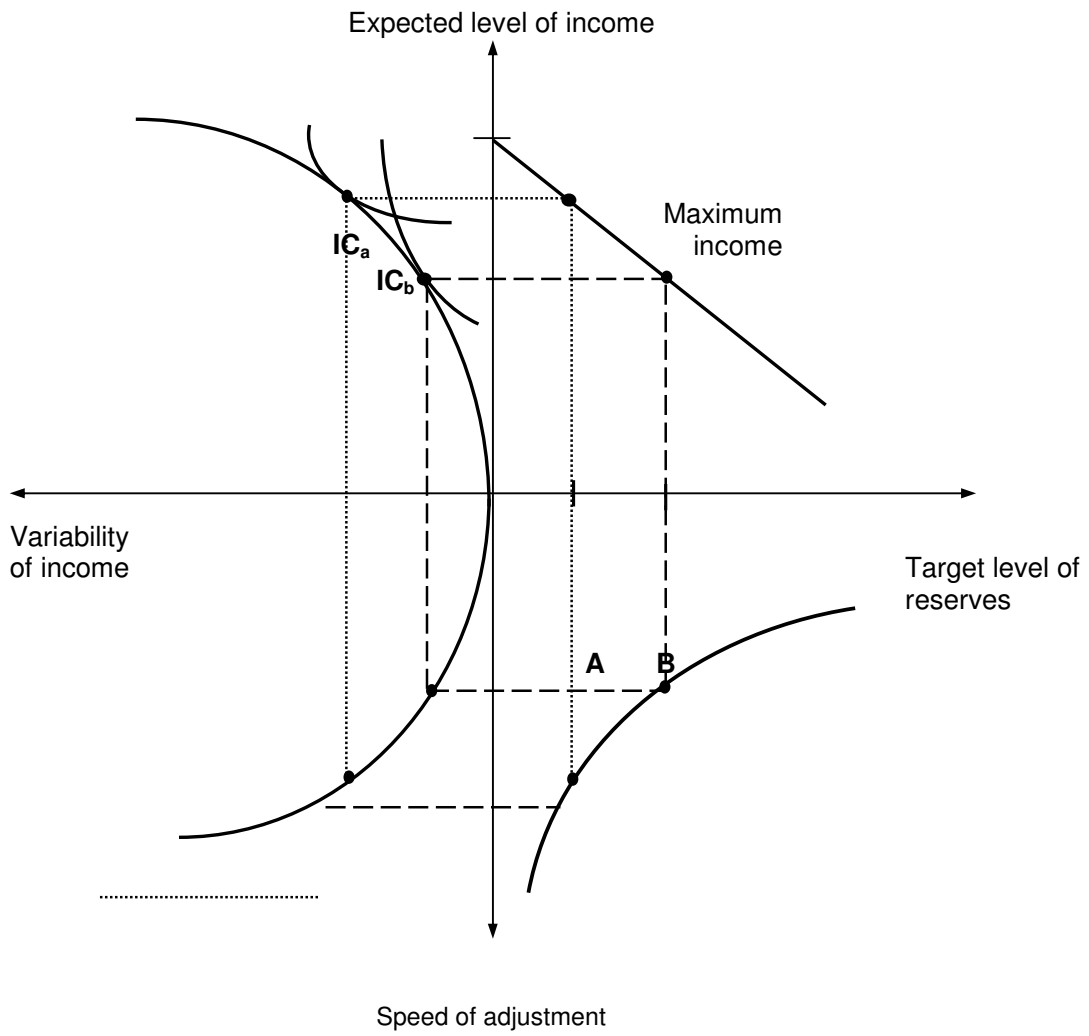
Assume further that $R_0 = BR_t e^{-u}$ where R_t = observed reserves². Equation A.1 can then be rewritten as follows:

$$\ln R = b_0 + b_1 \ln \sigma + b_2 \ln r + u \quad (\text{A.2})$$

Flood and Marion (2001) offer an overview of the original Frenkel-Jovanovic model, discuss how it has performed empirically, and then outline theoretical and empirical extensions to it.

² In other words, it is assumed that observed reserves are proportional to optimal reserves up to an error term that is uncorrelated with the standard deviation and opportunity costs of holding reserves.

Figure A1
Simple Cost-Benefit Framework Outlining Optimal Reserve Demand



Source: Bird (1985)

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**Table 1: Reserves as a Proportion of Imports (months),
GDP (%) and Average Amount (\$ million)
(1992–2001)**

Economy	1992	1995	1998	2001
<u>Indonesia</u>				
Imports ^a	3.0	2.7	5.1	11.0
GDP	8	7	19	21.1
Average ^b	10,376.7	13,022.5	19,020.8	27,863.5
<u>Malaysia</u>				
Imports ^a	4.2	3.0	5.1	4.6
GDP	30	27	34	35
Average ^b	15,082.8	25,063.0	21,441.8	28,071.3
<u>Philippines</u>				
Imports ^a	2.8	2.1	2.6	5.3
GDP	8	9	13	19
Average ^b	3,941.9	6,199.4	8,771.2	12,771.5
<u>Singapore</u>				
Imports ^a	5.7	5.7	7.3	7.8
GDP	82	82	90	91
Average ^b	38,028.3	65,798.9	73,170.9	75,687.8
<u>Thailand</u>				
Imports ^a	4.9	4.9	6.2	6.4
GDP	18	22	23	28
Average ^b	19,574.5	33,455.7	27,020.1	31,734.4
<u>Hong Kong, China</u>				
Imports ^a				
GDP	3.0	3.1	4.8	6.8
Average ^b	35	40	55	66
	N/A	53,283.5	92,826.8	113,307
<u>People's Republic of China</u>				
Imports ^a	3.1	5.9	9.5	9.0
GDP	4.6	10.7	15.5	15.9
Average ^b	33,875.2	67,595.4	145,535.8	194,410.2
<u>Republic of Korea</u>				
Imports ^a	2.2	2.5	5.1	8.2
GDP	5.0	4.0	5.0	4.0
Average ^b	15,365.3	29,679.9	42,351.3	97,834.1
<u>Japan</u>				
Imports ^a	2.1	3.9	5.0	N/A
GDP	2.0	4.0	5.0	8.5
Average ^b	71,408.6	16,6451.2	213,459.8	374,028.8

GDP = gross domestic product. N/A = Data are not available.

^a Ratio to average monthly imports of merchandise goods.

^b Average of total foreign exchange reserves minus gold.

Sources: International Monetary Fund, International Financial Statistics-CD ROM (December 2002) and Asian Development Bank database.

**Table 2: External Debt of the Asia-5 Economies^a (% of GDP)
(1995–2000)**

Country	1995	1996	1997	1998	1999	2000
Indonesia ^b	56.3	53.4	63.9	149.4	95.5	93.8
Republic of Korea	26.0	31.6	33.4	46.9	33.4	26.5
Malaysia	37.6	38.4	43.8	58.8	53.4	49.3
Philippines	54.9	55.0	61.6	81.7	75.7	78.9
Thailand	49.1	49.8	62.0	76.9	61.4	51.7

of which: Short-term Debt

Indonesia ^b	8.7	7.5	27.5	76.4	5.9	5.7
Republic of Korea	14.6	17.9	23.1	9.7	9.3	7.7
Malaysia	7.2	9.9	11.1	11.7	7.6	6.4
Philippines	8.3	12.0	14.0	15.6	11.3	7.5
Thailand	24.5	20.7	13.3	21.0	11.4	6.8

^a Asia-5 economies refer to Indonesia, Republic of Korea, Malaysia, Philippines, and Thailand.

^b Data for Indonesia exclude trade credits.

Source: IMF (2000).

**Table 3: Monthly Reserve-Import Ratio and Excess Reserve with Pooling,
ASEAN-5 and Japan
(1990–1998)**

Average Reserve-Import Ratio Without Pooling (months of imports)	Average Reserve-Import Ratio With Pooling (months of imports)	Average Actual Reserve (\$ million) (A)	Average Hypothetical Reserve With (100%) Pooling (\$ million) (B)
5.9	9.9	264,111.4	440,185.7
Excess Reserve: (B – A) (\$ million)			
176,074.3			

Source: IFS-CD ROM (December 2002) and Authors' own calculations

**Table 4: Monthly Reserve-Import Ratio and Excess Reserve with Pooling,
ASEAN-5 + Republic of Korea + People's Republic of China + Hong Kong,
China + Japan
(1990–1998)**

Average Reserve-Import Ratio Without Pooling (months of imports)	Average Reserve-Import Ratio With Pooling (months of imports)	Average Actual Reserve (\$ million) (A)	Average Hypothetical Reserve With (100%) Pooling (\$ million) (B)
5.4	12.0	414,837.4	921,860.9
Excess Reserve: (B – A) (\$ million)			
507,023.5			

Source: IFS-CD ROM (December 2002) and Authors' own calculations

**Table 5: Coverage With and Without Pooling for ASEAN-5
(Q1 1991–Q4 1996)**

Country	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	4.79	3.53	3.42
Malaysia	2.78	3.38	3.42
Philippines	2.47	3.37	3.42
Singapore	3.29	3.38	3.42
Thailand	3.31	3.41	3.42

Source: Authors' own calculations

Table 6: Coverage With and Without Pooling for ASEAN-5, Republic of Korea, People's Republic of China, and Japan (Q1 1991–Q4 1996)

Country	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	4.79	2.69	2.65
Malaysia	2.78	2.71	2.65
Philippines	2.47	2.65	2.65
Singapore	3.29	2.73	2.65
Thailand	3.31	2.69	2.65
Republic of Korea	2.90	2.66	2.65
People's Republic of China	1.88	2.54	2.65
Japan	2.66	2.53	2.65

Source: Authors' own calculations

Table 7: Coverage With and Without Pooling for ASEAN-5; People's Republic of China; Republic of Korea; Hong Kong, China; and Japan (Q1 1991–Q4 1996)

Economy	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	4.79	4.64	4.60
Malaysia	2.78	4.98	4.60
Philippines	2.47	4.61	4.60
Singapore	3.29	4.79	4.60
Thailand	3.31	4.69	4.60
Republic of Korea	2.90	4.63	4.60
People's Republic of China	1.88	4.12	4.60
Hong Kong, China	9.13	4.87	4.60
Japan	2.66	4.30	4.60

Source: Authors' own calculations

**Table 8: Coverage With and Without Pooling for ASEAN-5
(Q1 1998–Q1 2002)**

Country	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	6.71	10.99	12.22
Malaysia	6.16	10.84	12.22
Philippines	5.91	11.49	12.22
Singapore	31.66	15.58	12.22
Thailand	13.09	12.42	12.22

Source: Authors' own calculations

**Table 9: Coverage With and Without Pooling for ASEAN-5, Republic of Korea, People's Republic of China, and Japan
(Q1 1998–Q1 2002)**

Country	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	6.31	5.68	5.62
Malaysia	6.16	5.71	5.62
Philippines	5.91	5.64	5.62
Singapore	31.66	6.14	5.62
Thailand	13.09	5.78	5.62
Republic of Korea	3.15	5.24	5.62
People's Republic of China	6.52	5.87	5.62
Japan	4.28	5.16	5.62

Source: Authors' own calculations

Table 10: Coverage With and Without Pooling for ASEAN-5, Republic of Korea; People's Republic of China; Hong Kong, China; and Japan (Q1 1998–Q1 2002)

Economy	Coverage Without Pooling	Coverage With 50% Pooling	Coverage With 100% Pooling
Indonesia	6.31	6.07	6.02
Malaysia	6.16	6.10	6.02
Philippines	5.91	6.04	6.02
Singapore	31.66	6.51	6.02
Thailand	13.09	6.16	6.02
Republic of Korea	3.15	5.61	6.02
People's Republic of China	6.52	6.19	6.02
Hong Kong, China	10.21	6.36	6.02
Japan	4.28	5.44	6.02

Source: Authors' own calculations

Table 11: Average and Variability of Foreign Exchange Reserves

Economy	Precrisis		Postcrisis	
	Average Reserves (\$ million)	Variability of Reserves (\$ million)	Average Reserves (\$ million)	Variability of Reserves (\$ million)
Indonesia	11,791.4	2,462.5	25,480.7	4,034.9
Malaysia	21,080.6	7,569.5	28,150.8	4,568.7
Philippines	5,394.6	2,187.3	12,026.4	2,035.8
Singapore	51,214.4	15,584.6	75,258.2	2,377.1
Thailand	26,428.4	7,992.8	30,602.1	2336.1
Republic of Korea	22,447.5	7,727.9	75,750.8	24,057.8
People's Republic of China	49,073.4	26,122.9	168,005.4	25,786.4
Hong Kong, China	52,351.3	5,735.7	99,964.3	9,794.8
Japan	121,026.5	53,506.5	300,479.4	70,135.6

Sources: Computed from IFS-CD ROM (December 2002) and ADB database.

Table 12: Reserve Gains and Losses with 50% Pooling for Pre-crisis Period

Economy	Actual Average Reserves (\$ million)	Hypothetical Reserves (\$ million)	Gain (\$ million)	As % of Actual Average Reserves
Indonesia	11,791.4	11,426.0	(365.4)	(3.09)
Malaysia	21,080.6	37,696.1	16,615.5	78.8
Philippines	5,394.6	10,083.5	4,688.9	86.9
Singapore	51,214.4	74,650.2	23,435.8	45.8
Thailand	26,428.4	37,486.2	11,057.8	41.8
Republic of Korea	22,447.5	35,780.2	13,332.7	59.4
People's Republic of China	49,073.4	107,626.3	58,552.9	119.3
Hong Kong, China	52,351.3	27,932.8	(24,418.5)	(46.6)
Japan	121,026.5	230,077.9	109,051.4	90.1

() implies negative number

Source: IFS CD-ROM (December 2002) and Authors' own calculations