

International reserves and swap lines: the recent experience

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Executive Summary

The global crisis has witnessed an unprecedented rise of swap agreements between central banks of larger economies and their counterparts in smaller economies. This chapter explores whether such swap lines can reduce the need for reserve accumulation. The evidence indicates that there is only limited scope for swaps to substitute for reserves. For one thing, swap lines are extended only to fundamentally sound emerging markets, and to important trade partners. Crucially, sound fundamentals include ample foreign-exchange reserves. The highly selective nature of swap recipients means that only a small minority of developing countries will have access to swap facilities. Moreover, large central banks provide liquidity support only when it is in their self-interest. When market confidence is shattered, as happened in the case of the Republic of Korea during the 4th quarter of 2008, reserves fail to perform their precautionary function, even if the economy has sound fundamentals. The timing of market movements

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suggests that the Bank of Korea's swap agreements with the US Fed played a pivotal role in calming down market hysteria over a possible dollar shortage. Although overall there is only limited substitutability between swap lines and reserve accumulation, deepening swap lines and regional reserve pooling arrangements such as the Chiang Mai Initiative may weaken the precautionary motive for reserve accumulation. The Chiang Mai Initiative requires more concrete and specific governance structure and implementation details. Formalizing and institutionalizing swap lines will help transform them from temporary anti-crisis measures to more long-term mechanisms for liquidity support. These measures will make it less likely that Asia will gravitate toward the dollar standard.

1 Introduction

The global crisis of 2008-9 led to unprecedented proliferation of swap lines, including for the first time deep lines extended by the FED to emerging markets, as well as the Bank of China to several developing countries. This paper overviews the recent experience, summarizing research results at Aizenman, Jinjark and Park (2010), and reviewing the possible impact of deeper use of swap lines on the demand for international reserves. By any measure, developing Asia (henceforth Asia) has experienced an unprecedented build-up of FX reserves since the Asian financial crisis of 1997-8. Broadly speaking, there are two main explanations for the extraordinary growth of Asia's FX reserves in the post-crisis period: (i) precautionary self-insurance against financial crisis and (ii) mercantilist export promotion. The Asian crisis had a devastating economic and social impact on Asia. One plausible interpretation of Asia's reserve hoarding is that it is an attempt to build up an ample war chest of international liquidity to protect oneself against a repeat of the Asian crisis. This type of demand for reserves is known as the precautionary or self-insurance demand for reserves. The other main benefit of reserves is that buying foreign currencies to hold down domestic currencies can improve external competitiveness and thus promote exports. This type of demand for reserves is known as the mercantilist demand for reserves [see Aizenman and Lee (2007)]. There is yet a third motive for holding reserves, which is related to the first two but somewhat different – exchange rate stability, outlined by Calvo and Reinhart (2002). Exchange rate stability is often a key macroeconomic policy objective and in that case, rapid reserve growth may be the result of systematic foreign market interventions aimed at stabilizing the exchange rate.

From the perspective of the global reserve currency system, regardless of the relative importance of the different motives, the massive purchase of US dollar-denominated reserve assets by Asian countries has the effect of bolstering the status of the dollar as the world's dominant reserve currency. According to the so-called Brettons II view of global imbalances, much of Asia has in effect reverted to the tightly managed dollar-based exchange rate regimes, after a brief experimentation with more flexibility during the Asian crisis period. The term Bretton Woods II draws an analogy between the exchange rate behavior of Asian countries since the Asian crisis and the Bretton Woods system of pegged but adjustable exchange rates that was in place between 1945 and the early 1970s.

It is doubtful whether such a relentless accumulation of FX reserves is optimal for Asia's self-interest. According to most conventional measures of reserve adequacy, the region now has

reserves far in excess of all plausible estimates of what it needs.¹ This has led to calls for managing such reserves more actively. In the period immediately preceding the global financial crisis, parking surplus reserves in safe and liquid but low-yielding US government securities was increasingly seen as a waste of valuable national resources. The creation of sovereign wealth funds (SWFs) such as China Investment Corporation (CIC) and Korea Investment Corporation (KIC) represent a policy response to growing popular pressure to use surplus reserves for active profit-seeking investment rather than passive liquidity management.² In addition to the opportunity costs of foregoing more productive and profitable investment opportunities, the global financial crisis has exposed the risks of investing in industrialized countries. More specifically, the crisis, which originated in industrialized countries, tarnished their long-standing reputation for safe and efficient financial markets as well as sound financial regulation and macroeconomic policies. The upshot for Asia's reserve management is that holding massive amounts of reserves in the form of US government securities is not without risks. A sustained depreciation of the US dollar and consequent valuation losses is another large potential cost..

One way to reduce such costs is to use reserves more productively via sovereign funds and more generally, by active reserve management. Although the global financial crisis has inflicted heavy losses on Asian sovereign funds and temporarily dampened their risk appetite, they provide an important channel for more productive use of reserves in the medium- and long-term. There are already signs that the funds are returning to the financial markets, and there are indications that the People's Republic of China (PRC) may inject up to US\$250 billion of fresh capital into CIC. However, investing surplus reserves more efficiently after they have already been accumulated is a second-best solution. The first-best solution is to avoid building up such large reserves in the first place. Furthermore, if we view reserves as insurance, pooling risks is more efficient than individual risk bearing. That is, collective insurance is always less costly and more efficient than self insurance. The seemingly irrational behavior of reserve hoarding can be partly explained by the region's loss of confidence in the IMF during the Asian crisis.

The global financial crisis has witnessed a proliferation of swap agreements, which can potentially reduce the demand for reserve hoarding. Perhaps the best known example is the US\$30 billion swap lines between the US Fed and the central banks of Brazil, the Republic of Korea (Korea), Mexico and Singapore opened in October 2008 during the peak of the crisis. In

¹ Park and Estrada (2009) provide a comprehensive analysis of the issue of whether Asia's reserves have reached excessive levels. Obstfeld, Shambaugh and Taylor (forthcoming) find empirical support a broader self-insurance view, where reserves provide a buffer against both deleveraging initiated by foreign parties and sudden demand of domestic residents for external assets, i.e., "sudden capital flight."

² Park (2007) provides a comprehensive analysis of the emergence of Asian SWFs.

principle, swaps can either substitute for or complement reserves. To the extent that swaps provide liquidity during emergencies, central banks can cut back on reserve holdings. On the other hand, only countries with large reserves may be able to secure swap agreements and this may encourage countries to accumulate reserves. In addition, large reserves and swap lines can jointly restore the confidence of financial markets in a country's liquidity and solvency. The broader issue of interest is whether swap lines can slow down the speed and scale of Asia's reserve accumulation. An important integral part of Asia's swap agreements is the Chiang Mai Initiative (CMI) which encompasses a network of bilateral agreements between ASEAN + 3 (the PRC, Japan and Korea).

The unprecedented provision of \$120 billion in swap lines to 4 the emerging markets by the US Fed in October 2008 provided welcome relief and an important signal to the financial markets. Yet the exposure of US banks was the single most important criterion for extending swap-lines to the four countries [see Aizenman and Pasricha (2010)]. These ad hoc facilities would not suffice in protecting exposed countries from an Asian crisis-type crisis in the absence of self insurance. Furthermore, the selectivity of the swap lines suggests that only countries with solid past record of governance and significant trade and financial linkages can expect access to such ad hoc arrangements, on a case by case basis. Moral hazard concerns suggest that the applicability of these arrangements will remain limited. Mitigating moral hazard should be the prime responsibility of the international financial institutions, in particular the IMF. Due to the "cherry picking" nature of the swap lines between central banks, access to IMF lines of credit would remain a valuable option for many developing countries, but it is an option that countries may choose to avoid by means of alternative insurance arrangements.

Specifically, regions characterized by deepening trade and financial integration would benefit from cooperative regional arrangements, including regional swap-lines and international reserves pooling arrangements. Asia is a good example of a region that stands to gain substantially from collective regional insurance. Intra-Asian trade has grown rapidly in recent years and this trend is likely to gather speed in light of the general weakness of the industrialized countries and hence their diminished appetite for imports. The prospective rebalancing of Asian countries toward domestic demand should also strengthen intra-regional trade, especially in final goods. The resulting shift of intra-Asian trade from parts and components to final goods will make trade among Asian economies less dependent upon final demand from outside the region. While intra-Asian financial integration lags far behind intra-Asian trade integration, we can expect financial linkages to grow as the regional economies become financially more developed. A further impetus for intra-regional financial integration may

come from heightened reluctance to invest in industrialized countries in the wake of the global crisis. Other characteristics of Asian countries which work in the favor of swap arrangements and regional reserve pooling include high reserve-GDP ratios, high saving rates and lingering mistrust of the IMF.

2 Swap Lines and International Reserves

Swap lines may act to stabilize market concerns about the risk of losing control due to deleveraging pressures, thereby preventing downward pressure on international reserves and the exchange rate, substituting the need to hoard reserves. This possibly was the case of Korea, where the introduction of the Fed swap line prevented a replay of the crisis dynamics of 1997 [see Park (2009)]. In these circumstances, access to swap lines would mitigate the need for Korea to hoard reserves to replace the 60 billion dollars of reserves it used during the first phase of the crisis. Yet, uncertainty regarding the duration of these swap lines, and lingering concerns that in the absence of these swap lines the initial level of reserves was insufficient to prevent crisis dynamics may induce countries to further accumulate reserves in the future. Therefore, intuitively, perceptions about the duration of swap lines play a key role in determining the future path of reserves. To the degree that regional arrangements like the Chiang Mai Initiative offer pooling schemes of indefinite duration, they may mitigate the urge to hoard reserves.

A related issue is the currency composition of swap lines. There is no reason why swap lines have to be denominated solely in US dollars. Just as countries typically hold reserves in different currencies, they could agree to help each other by providing a basket of currencies rather than a single currency. The denomination of swap lines in non-dollar currencies will speed up the diversification of reserves away from dollars into other currencies. For example, euro-denominated swap lines will raise the demand for euro reserves since swap lines are ultimately a mutual promise to provide liquidity support in case of emergencies and that promise will not be credible in the absence of reserves. For Asian countries, a more realistic scenario is the denomination of swap lines in the currency of a dominant regional economy such as the PRC or even a real or notional Asian currency. Such development would further speed up the shift away from dollar reserves and the emergence of an Asia-specific hard currency much like the Europe-specific euro. In fact, PRC's central bank has already entered into yuan-denominated swap agreements with its counterparts in Korea, Hong Kong, China, Malaysia, Belarus, Indonesia and Argentina. A number of other central banks have also expressed a willingness to enter into swap agreements with the PRC. The growing popularity of yuan swaps reflects the rapid

emergence of the PRC as a globally significant trading power. Despite the PRC's financial underdevelopment and the yuan's restricted convertibility, growing trade with the PRC gives the yuan some intrinsic value.

There is also an intriguing possibility that broadening and deepening of the Chiang Mai Initiative could result in a more permanent and institutionalized form of regional precautionary insurance against financial crisis. Especially significant was the agreement to establish an independent regional surveillance unit which would monitor the region's economies and support CMIM decision-making. While the formal unit is being set up, the ASEAN Secretariat (ASEC) and ADB are working out an interim surveillance arrangement based on existing surveillance process. The ASEAN+3 independent regional surveillance unit is intended to supplement rather than replace the IMF. It is primarily a mechanism for objective economic monitoring. Under the CMIM, a country can draw up to 20% of its quota without being subject to IMF conditionality, although the duration is restricted to a maximum of 6 months. Should a country avail itself of its full quota, 80% of the total amount disbursed would be tied to an IMF program. Once the regional surveillance unit becomes fully operational, the amount that member countries can withdraw without IMF conditionality could be increased. The collective CMIM agreement on the process of managing a regional pool of international reserves marks a major milestone in institutionalizing Asian regionalism.

3 The implications of the global financial crisis on the dollar standard's sustainability, and alternative options

The global financial crisis, which originated in market failures in the housing and financial markets of the US, brings into question the desirability and feasibility of pegging Asian currencies to the dollar as the keystone for the regional stability and future growth. The alleged gains from pegging to the dollar are debatable, and there is scarcity of studies that tested it carefully against alternative hypotheses. The instability of the dollar against the euro and other key currencies implies that pegging to the dollar would increase the domestic currency volatility against the euro, pound and other currencies. This effect may be sub-optimal for countries that trade heavily with the euro bloc and experience an increase in such trade over time. One way to deal with this issue is to evaluate what would have been the optimal weight of achieving real exchange stability against a basket of currencies that reflect the actual trading patterns of the region.

Recent studies dealing with the Trilemma [Aizenman, Chinn and Ito (forthcoming)] are consistent with the notion that emerging market countries have moved towards the Trilemma

middle ground, associated with greater exchange rate flexibility and limited but growing financial integration, buffered by sizable reserve holdings.³ This has enabled them to retain a degree of monetary autonomy, even as financial integration continued – e.g, Indian and the PRC before the crisis, a time that both countries grew rapidly while maintaining controlled financial openness and limited exchange rate flexibility. During that time, the Chinese yuan appreciated significantly, without obvious downside effects. The onset of the crisis led to the renewed pegging of the yuan to the dollar, but is not self-evident that returning to a rigid peg to the dollar is desirable and sustainable in the post-crisis period. Applying data predating the crisis, countries which pegged their currency to the dollar have not preformed on average better than those that allowed controlled flexibility. During crises, many developing countries found that allowing the real exchange rate and monetary policy to initially take the brunt of the required adjustment to a crisis facilitated the adjustment process.

During the second half of 2008, Korea used both FX reserves and swap lines to cope with turbulence in its FX and financial markets. In the case of Korea, the global crisis also had adverse effects on both the real economy and financial system. During the course of 2008, Korea suffered an unusually high degree of financial instability relative to other countries in the region. The instability reached its peak during October when the Korean won teetered on the verge of collapse and the stock market plunged by one third. There were even widespread fears of a repeat of the Asian crisis. The financial stress was puzzling in light of Korea's relatively strong macroeconomic fundamentals – e.g. GDP growth – and microeconomic fundamentals – e.g. corporate balance sheets. Furthermore, Korea was the world's sixth largest holder of FX reserves when it entered the crisis.

The most likely answer to the puzzle lies in Korea's exceptionally high degree of capital degree liberalization. For example, there are almost no restrictions on foreign residents' purchase and sale of domestic equities or domestic financial institutions' foreign borrowing. Hedge funds and other foreign residents withdrew from Korean equities in droves to reinforce their balance sheets back home as the global financial crisis intensified. Those sales were the main drivers of the year-long plunge of the equity market and also contributed to the won debacle in October. The Korean experience should serve as a cautionary tale for other developing Asian countries about the substantial risks of capital account liberalization. Countries which are more open toward cross-border capital flows will suffer disproportionately when foreign residents withdraw their funds from the local financial markets. A simplified overall

³ Both trends are more pronounced for the emerging markets than for the non-emerging developing countries.

picture of the Korean experience is as follows: a country with an ample pool of reserves tries to defend its currency with massive but ineffective FX market intervention, and is ultimately rescued by swap agreements. The limited effectiveness of high reserves-to-GDP ratio in containing market pressures reflects Korea's vulnerability to balance sheet effects due to its heavy short term borrowing in foreign currencies as well as its vulnerability to massive de-leveraging by foreign portfolio investors during the global crisis [see Aizenman (2009)].

4 Empirical Analysis of Swap Lines

In this section, we report and discuss the results of our empirical analysis of swap lines, based on cross-country data. Since December 2007, swap agreements involve 24 countries shown in Table 1. Collectively, the economic size of the countries involved is equal to 85 percent of world GDP. For the initial amounts, swap line from the US Federal Reserve is the largest (14 lines, 755 billion USD). The People's Bank of China extends swap lines to 6 countries (650 billion Yuan) and the European Central Bank 4 countries (31.5 billion Euros).

[Table 1]

The swap lines extended from the Federal Reserve to the ECB, the Bank of Japan, and the Bank of England are among the largest. Better institutional quality means lower moral hazard and therefore more elastic access to larger swap lines, which seems to be the case for the swap lines among the OECD countries.⁴

The actual use of the Fed's dollar swaps has been limited and the amounts outstanding have gradually declined across the receivers (to 57 billion USD in September 2009). Canada, Brazil, Singapore, and New Zealand never used the dollar swaps. These swap lines were originally authorized through February 1, 2010, but were re-scheduled to October 30, 2009.

From December 2007 to October 2009, the swap receivers accumulated larger foreign reserves, experienced more nominal depreciation, de-leveraged bigger amount of short-term debts and witnessed more decline in export credits. The evidence from short-term debts and export credits also suggest that the swap receivers are more exposed to the (lagged) effects of a general deterioration of conditions in global short-term funding markets.

⁴ Swap lines resemble unsecured sovereign debt, and may be constrained by similar considerations. Hence, factors that explain better access to the sovereign borrowing may also explain easier access to larger swap lines. These factors include low volatility, higher trade openness, credibility associated with history of low incidence of default and good growth prospects, quality of institutions, etc. All these factors play a role in explaining the differential patterns of access and the use of swap lines.

Obstfeld et al. (2009) find that currencies of countries holding more reserves relative to M2 have tended to appreciate in the crisis, whereas those with smaller foreign reserves have depreciated. They also note that the dollar swaps to the emerging markets have been largely symbolic since Brazil, Korea, and Singapore already had foreign reserves more than predicted. Our evidence suggests that the EM swap recipients experienced larger nominal depreciation and reduction of short-term debt stocks. Given that most of the EM's short-term external debts are foreign currency denominated, the swaps might have been in place to backstopping these emerging markets and substituting for a large hoarding of reserves for a period of time.

There is also a noticeable decline in export credits of developing countries (10 percent of the short-term external debts), probably reflecting the effects of adverse global short-term credit market conditions on the real side of global economy. Previous studies underline the importance of trade credits as a financing vehicle between the buyers and sellers, as well as the source of external finance.⁵

We explore further the relationship between swaps and international trade for all possible countries. Our estimation show the importance of swap recipients in term of the provider's export destination is associated with a larger swap extended from the Fed and the PBoC. For the dollar swap lines, the results might be driven by the presence of Japan and the euro area, which account for 7 and 20 percent of the US exports, respectively. For the swaps from the PBoC, the association between swaps and export share is also systematic as Hong Kong, China, Korea, Indonesia, Malaysia, and Argentina account for 12, 4, .9, 1.1 and .2 percent of the PRC's total exports, respectively.

During the crisis of 2008, the frequent concern voiced towards the emerging markets has been on the possibility that their foreign reserves were too low relative to GDP and to short-term external debts. Indeed, history has never been short on providing the evidence of concurrent external liquidity and currency runs. As noted earlier, Obstfeld et al. (2009) find that currencies of countries holding more reserves have tended to appreciate in the crisis. Focusing on the 2008 crisis, our estimation show that larger depreciation is associated with larger [ST Debts – FX Reserves]/FX Reserves and lower FX Reserves/GDP ratios.

The swap recipients seem to be indistinguishable from the non-recipients in terms of their nominal depreciation and short-term financing gap. Focusing on the recipient group, however, shows some difference between the recipients of the PRC's swaps (Argentina, Indonesia, and Malaysia) and the other swap recipients. In relation to the prediction line, the recipients of the

⁵ Jinjarak (2007) provides some evidence that lagged trade credits forecast import, but not vice versa.

PRC's swap have experienced smaller actual nominal depreciation than predicted. On the other hand the recipients of the US's swaps (Brazil, Korea, and Mexico) and the ECB's swaps (Hungary and Poland) have had larger actual depreciation than the predicted ones. One interpretation of this evidence is that the PRC's swap liquidity has been complementary to international reserves as an effective insurance against the instability of its recipient's currency, while the swaps from the Federal Reserve and the ECB have play a substitute role to the foreign reserves accumulation of the emerging markets.

A limitation of our analysis is that, at this stage, we are unable to control for the factors accounting for foreign currency pressure – for example, deleveraging pressures and drop in net exports, as well as country-specific balance sheet exposures. Ideally, one needs to control for these variables in order to understand the marginal contribution of swap lines. Our estimation results are consistent with the possibility that the introduction of swap lines is more important than the actual use of these lines. This would be the case if countries value flexibility granted by the swap line, providing the option value of using it if the crisis would deepen. Yet, the actual use of a swap line may be associated with a stigma, implying that countries would prefer to delay to use of swap line as a last resort (or at least as a secondary resort). Hence, somewhat paradoxically, countries that are eager to have access to swap lines in a crisis may prefer to refrain from using it.

5 Concluding Observations

One key stylized fact of global FX reserve management during the global financial crisis has been the proliferation of swap agreements between large central banks such as the US Fed, PBOC and ECB on one hand and the central banks of emerging markets on the other hand. An important issue which arises in connection with the swap deals is the extent to which they can mitigate the precautionary or self-insurance motive underlying the unprecedented reserve accumulation in developing countries immediately prior to the global crisis. At a broader level, swap lines can substitute for reserves since the two serve the same basic purpose – they are both international liquidity which can be called upon in case of unexpected shortages of international liquidity. Upon closer inspection, there are clear limits to substitutability between swaps and reserves. Above all, the credibility of reserves in the eyes of financial markets is ultimately determined by the credibility of the central bank holding the reserves while the credibility of swap lines is determined by the credibility of the central bank providing the liquidity support. Of course, one may question the credibility of the US Fed in light of the fact that the global crisis originated in the US. However, the somewhat paradoxical appreciation of the dollar

at the slightest sign of global financial distress – e.g. Dubai crisis – attests to the enduring safe-haven status of the dollar.

Overall, the evidence indicates that by and large swap lines are extended only to fundamentally sound and well-managed emerging markets. Crucially, sound fundamentals include healthy levels of FX reserves. The highly selective nature of swap recipients means that a majority of developing countries will not have access to swap facilities. For those countries, swap lines cannot possibly be a substitute for reserve accumulation for the simple reason that the central banks of large countries are unwilling to provide them with swap lines. Of course, there are other substitutes for individual reserve accumulation such as regional reserve pooling arrangement or access to IMF credit lines. More fundamentally, our evidence shows that large central banks tend to extend swap facilities only to those countries with which they have strong financial and trade linkages. In other words, while swaps can contribute to the global public good of global financial stability, in fact large central banks provide liquidity support only when it is in the self-interest of their respective countries to do so. In the context of swap lines motivated by the self-interest of providing countries, a particularly interesting result from our empirical analysis is the strong influence of trade, in particular exports, in the determination of recipient countries. That is, large central banks tend to enter into swap agreements with their counterparts in countries which are important export markets. Although this pattern holds for large central banks in general, what is striking is that it helps to explain the recent rise of the PBOC as a major provider of swap facilities. For all its spectacular growth, the PRC's financial system is still under-developed and lags far behind the country's real economy. The depth, breadth, liquidity and sophistication of its financial markets fall far below that of financial center countries, which explains why the PRC invests so much of its savings in US financial markets. Furthermore, the credibility of the PBOC is not noticeably greater than that of central banks in other emerging markets even though it sits atop the world's largest stockpile of reserves. Nevertheless, the emergence of the PRC as a globally significant trading power gives the yuan some intrinsic value despite the country's financial under-development. In particular, the yuan can be used as to pay for imports from the PRC, which is large and growing in many countries given the sustained rapid growth of the PRC's exports. The inclusion of countries such as Argentina and Belarus, not known for strong fundamentals nor sound management, among PBOC's swap recipient countries points to the overarching dominance of export markets as the key criterion. Be that as it may, the growth of yuan-dominated swap lines may be a precursor to the eventual emergence of the yuan as a new reserve currency.

The Korean experience is highly significant because it is a real-world case of a country

simultaneously using both FX reserves and swap deals to deal with financial instability during the global financial crisis. When market confidence is shattered, FX market intervention to stabilize exchange rate becomes ineffective, even if the economy has sound fundamentals. That is, reserves fail to perform their precautionary or self-insurance function when tail-end risks are realized. In fact, in the case of Korea, declining reserves themselves intensified market fears and concerns, forming a vicious cycle in which adverse market sentiment drive down reserves via FX market intervention and the decline in reserves, in turn, further dampens market sentiment. The timing of market movements suggests that BOK's three swap agreements, in particular the agreement with the US Fed, played a pivotal role in calming down the growing market hysteria over a possible dollar shortage. Quite clearly, the swap agreement would have been much less effective in the absence of strong fundamentals, including healthy reserve levels. A plausible interpretation of the Korean experience seems to be that swap lines which have important signaling effects, such as the BOK-Fed deal, can restore the precautionary or self-insurance function of reserves.

One big puzzle in Asia's FX reserve management during the global crisis was the complete absence of the Chiang Mai Initiative (CMI). It was precisely the type of financial turbulence visited upon Korea in the second half of 2008, precipitated by market jitters about prospective shortage of international liquidity, which gave rise to the CMI. However, Korea turned instead to the US Fed for primary support when push came to shove and the country teetered toward a full-fledged financial crisis. Even CMI partners PBOC and Bank of Japan played only a secondary role and outside the CMI framework at that. Indonesia, another CMI member which also experienced some financial turbulence, also did not turn to CMI. What is needed for member countries to make greater use of the CMI in the future is more concrete and specific governance structure and implementation details. Encouragingly, as noted earlier, substantive progress has been made since the global crisis toward the multilateralization of the CMI (CMIM), which came into effect on 24 March 2010. In fact, the global crisis has served as a catalyst for CMIM. The resolution of politically sensitive issues such as the relative share of contributions among member countries, as well as the establishment of clear conditions for withdrawal of reserves and an independent regional surveillance unit, is expected to significantly boost the attractiveness of CMI as a source of funds during a future crisis. Despite the progress, a range of issues relating to the governance, operations and technical details still remain unresolved. These include precisely how withdrawal requests will be evaluated and precisely how funds will be disbursed.

In addition to deepening regional reserve pooling arrangements – i.e. the CMI – another policy

option for mitigating the need for precautionary reserves is to lengthen the duration of swap agreements. The evidence of our analysis suggests that swap lines are motivated primarily by the self-interest of provider countries, but in fact they deliver substantial benefits for both provider and recipient countries. For provider countries, swaps help to safeguard the economic interests they have in countries to which they extend swap lines. The interests may take different forms – e.g. the exposure of US banks or a significant export market – but they can be substantial. For recipient countries, swaps help to restore financial stability during episodes of extreme financial distress when even large stockpiles of FX reserves fail to reassure markets. It is entirely possible that swaps are mutually beneficial not only during crises but also during normal non-crisis periods. Formalizing and institutionalizing swap lines so that they are transformed from temporary anti-crisis measures to more long-term mechanisms for liquidity support may dampen the need for precautionary reserve hoarding.

At a broader level, the unprecedented scale and speed of Asia's reserve accumulation in the pre-crisis period is likely to have been sub-optimal. According to the dollar standard view of global imbalances, Asia seeks to achieve rapid economic growth by adopting macroeconomic and exchange rate policies that keep exchange rates very competitive on a sustained basis. A centerpiece of such policies is systematic intervention in the FX market to purchase US dollars and de facto pegging to the US dollar. The rapid build-up of reserves is a highly visible consequence of those policies. The global financial crisis has shattered the myth that the dollar standard was sustainable for a long period of time since it benefited both Asia - rapid growth driven by rapid growth of exports – and the US – which obtained cheap external financing due to massive Asian purchases of low-yielding US government bonds. The global crisis was a painful wake-up call that Asian over-production counterbalanced by US over-consumption is ultimately an unsustainable game which harms all countries.

Finally, since financial instability in emerging markets is usually the result of volatile capital flows and the fundamental purpose of precautionary reserves is to limit financial instability, the most effective way to dampen the precautionary accumulation of FX reserves may be to limit volatile capital flows. Controlled financial integration which retains some restrictions on capital flows can directly limit financial instability, which, in turn, will limit the need for precautionary FX reserves. One possible solution to sudden stops and de-leveraging is a Pigovian tax scheme, where inflows of portfolio flows and external borrowing above a threshold may be taxed at an increasing rate [Aizenman (2009)]. Such a tax scheme would curtail exposure to the growing hazard facing the recipient country due to possible de-leveraging. It will induce the foreign investor to internalize the externality associated with possible costs of de-leveraging, and would

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reduce the cost of self insurance by funding some of the self insurance.

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Table 1

This table provides the initial swap lines provided by the U.S. Federal Reserve (billion USD), the European Central Bank (billion Euro), and the People's Bank of China (billion Yuan).

<u>Country</u>	FED_USD	ECB_EURO	PBC_CNY
Argentina			70
Australia	30		
Brazil	30		
Belarus			20
Canada	30		
Denmark	15	15	
ECB	240		
Hong Kong, China			200
Hungary		5	
Iceland		1.5	
Indonesia			100
Japan	120		
Korea, Rep. of	30		180
Mexico	30		
Malaysia			80
Norway	15		
New Zealand	15		
Poland		10	
Sweden	30		
Singapore	30		
Switzerland	60		
United Kingdom	80		