

INTERNATIONAL LIQUIDITY MANAGEMENT SINCE THE FINANCIAL CRISIS

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This article discusses how international liquidity management has been affected by the recent crisis.¹ It begins, however, with a brief review of developments in reserve-holding since the Bretton Woods system collapsed in 1971.

1. Reserve-holding behaviour since the end of Bretton Woods.

The collapse of the Bretton Woods system was accompanied by the abandonment of pegged exchange rates against the dollar and a general though not universal resort to floating exchange rates.² It was widely expected that the demand for international reserves would diminish, since countries were no longer obliged to sell foreign currencies in case of need to support their own currencies in foreign exchange markets. The expectation turned out to be seriously mistaken, however. International reserves increased in total from 3.1% of world gross product at the end of 1970 to 16.7% at the end of 2013. These figures include gold valued at current market prices; over the same period, foreign exchange reserves increased from 1.6% of gross product to 15.5%. Most of the increase occurred early in the 21st century, from 2002 – 2013 (see Figure 1).

The purpose of this section is not to provide a full explanation of reserve developments over the past forty years, but rather to make clear that different countries have been motivated by very different considerations in their reserve-holding behaviour. Foreign exchange reserve holdings are remarkably highly concentrated: at the end of 2014, six countries between them held two thirds of the world total. Large holders of foreign exchange reserves are listed in Table 1.

Within this group, many countries' reserve-holding behaviour in the years preceding the recent financial crisis can most readily be explained by country-specific factors, as follows³.

- a. Countries rich in natural resources tend to hold large foreign exchange reserves. It is natural that they should want to save much of their income from natural resources, since those assets are depletable, and their world

¹ The article is an adapted and updated version of *International Liquidity and the Financial Crisis*, by William A. Allen, published by Cambridge University Press 2013.

² For an account of the break-up of the Bretton Woods structure, see James (1996, chapters 7, 8 and 9).

³ See also the IMF's survey of reserve behaviour in Moghadam (2010).

prices may fall. Acquisition of reserves represents a diversification of wealth out of natural resources into financial assets. The correlation coefficient between year to year changes in the dollar price of crude oil and changes in total foreign exchange reserves (valued in dollars) over the period 1958 – 2010 was 0.28, which is statistically significant at the 97.5% level (one-tailed test).

- b. In some cases, notably China and Japan, very large holdings of foreign exchange reserves may be partly explained as a joint product of high domestic savings rates and economic strategies aimed at export-led economic growth, as part of which any appreciation of the nominal exchange rate is substantially restrained⁴.
- c. In some countries, demographics may influence reserve-holding behaviour. For example, China's one-child policy means that the population will age over the coming decades, and Japan's population is ageing too. The United Nations has forecast that the percentage of the total population which is of working age (assumed to be 15 - 64) will fall between 2011 and 2050 from 71.5% to 56.7% in China and 59.4% to 44.6% in Japan⁵. These countries will probably run current account deficits as their populations age, and building up foreign assets now can be seen as part of a strategy of smoothing consumption over time. China's official foreign assets, which amount to over \$3,000 per citizen, do not seem excessive from this viewpoint, bearing in mind that China's private foreign assets are probably not large.
- d. Switzerland's extraordinarily large accumulation of foreign exchange reserves may be attributed to the Swiss National Bank's reaction to the massive surge in demand for Swiss francs, partly to repay Swiss franc debts accumulated before the crisis (see Allen 2013, chapter 4), but more importantly as a financial refuge from the continuing crisis in the euro area. The rise in reserves resulted from the decision not to allow the Swiss franc to appreciate below CHF 1.20 = EUR 1 in order to protect the Swiss economy; that decision was reconsidered early in 2015 in order to prevent further reserve accumulation.
- e. In some countries, such as Korea and Thailand, and more recently Denmark, Sweden and the United Kingdom, painful memories of past financial crises in which domestic banks suddenly lost access to foreign currency deposits have led to the precautionary enlargement of foreign exchange reserves.

⁴ For discussion of China's reserve accumulation, see Prasad and Sorkin (2009).

⁵ See United Nations (2010).

- f. Other countries' behaviour is influenced by their political situation - for example Taiwan's very large reserve holdings probably partly reflect its anxiety about political isolation.

Some of these motives are motives for holding financial wealth, but not necessarily in the form of liquid foreign exchange reserves. And indeed several countries, including many of the large reserve holders, have established sovereign wealth funds to hold less-liquid financial assets which promise a higher return over the long term. It is not clear why some of them, especially those such as China and Japan which will experience serious demographic problems, continue to hold such large liquid reserves.

After the advent of floating exchange rates, a substantial group of other countries behaved in accordance with the prior general expectation and maintained quite small foreign exchange reserves. They had no obligation to intervene in foreign exchange markets to support their currencies; and recognised that reserve holding involved some net cost, the foreign-currency yield on reserve assets, adjusted for risk, generally being less than the cost of financing them in foreign currency, while if reserves were financed in domestic currency, they carried a foreign exchange risk. The countries in this category include Australia, the euro area, Denmark, Sweden, and the United Kingdom, all of whose reserves constituted quite a small percentage of their GDPs. Some of the countries in this group are international financial centres, which clearly did not anticipate the sudden drying-up of wholesale funding for international banks which occurred in 2008. As a result, many of them had insufficient reserves to manage that crisis without help from the swap lines established by the Federal Reserve.

2. The effects of the crisis on reserve-holding behaviour.

The demand for foreign-currency liquidity increased suddenly in many countries during the financial crisis of 2008–09 as a result of the large international flows of funds to the United States and Japan, and wholesale inter-bank markets and foreign exchange swap markets were disrupted. Much of the demand was accommodated and the resulting disruptions eased by the provision of central bank swaps, mainly by the Federal Reserve.⁶ After the financial crisis, things could not go back to where they were. Governments and central banks, like commercial banks and non-financial companies, wanted more 'liquidity assurance' - that is, assurance that they would have adequate international liquidity as protection against another financial crisis⁷. Immediately after the crisis, there was a debate about how such assurance could be provided, and some international institutions have been adapted and others newly created, but these changes seem likely to be ineffective.

The demand for liquidity assurance depends on the extent of the liquidity risks that systemically-important commercial banks and other companies are running. Financial regulation has been tightened in the wake of the crisis, as regards both capital and liquidity.

⁶ See Allen (2013).

⁷ By 'international liquidity' is meant access to means of international payment.

The Basel 3 regime of bank regulation, introduced in response to the crisis and the evident failure of the previous Basel regimes to prevent it, includes the first internationally-agreed minimum liquidity ratios that banks must observe⁸. The likely effects of these minimum ratios are discussed in section 4 below. Despite the tightening-up of regulation, it would be foolish to assume that the risk of future crises has been eliminated.

a. *Evaluating techniques for providing international liquidity assurance*

Satisfactory techniques for providing international liquidity assurance should meet the following criteria:

- they should provide adequate reassurance about their international liquidity needs being met to those countries which need it.
- they should avoid excessive moral hazard, and in particular avoid giving countries in 'fundamental disequilibrium' the means to delay necessary adjustment.
- they should avoid placing unreasonable burdens on liquidity providers.

It is possible to design multilateral or bilateral structures for providing liquidity assurance that enable countries to get credit in case of need. Such structures provide, in effect, a 'lender of last resort' in international financial markets, at least up to the limit of the available credit facilities. All techniques which involve credit also involve moral hazard, however. If credit is made automatically available, then borrowers with short-term horizons have an incentive to over-borrow. In normal circumstances, the lender conducts a full credit assessment before providing funds. However, in a financial crisis, quick decisions are often essential. There may not be time for a full assessment.⁹ The Fed's speed of reaction in 2008 was crucial to the effectiveness of its swap operations. In the absence of adequate multi- or bi-lateral structures, a country can get liquidity assurance by building up its own foreign exchange reserves so that it has access to the funds it thinks it might need. This is self-insurance.

⁸ In his history of the Basel Committee on Banking Supervision, Goodhart (2011, chapter 9) reports the discussions that took place in the BCBS on liquidity issues between 1975 and 1997. The BCBS achieved an accord (later known as Basel 1) on regulating the capital adequacy of banks in 1988, but, despite extensive discussion, it achieved no comparable accord on regulation of bank liquidity. In Goodhart's view, this was a serious failure, which can be attributed to three main reasons. First, the concept of liquidity was 'slippery and fluid', and there were differences of view on the extent to which liability-based management of liquidity was acceptable, and the extent to which supervisors should insist that banks held liquid assets. Second, the liquidity of particular assets depends on the willingness of central banks to purchase them, or accept them as collateral for loans, in open-market operations. Any international agreement on regulation of bank liquidity would have required central banks to harmonise the range of assets eligible for use in open market operations. No central bank wanted to change its procedures, and in any case, the impending capital adequacy accord applied lower risk weights to liquid assets and thus was expected to encourage liquid asset holdings without the need for any separate accord on liquidity regulation. The third reason was simply that the time and energy of BCBS members had been largely exhausted on the capital adequacy accord, and there was none left for a negotiation about liquidity. Consequently, while the earlier downward trend in banks' capital ratios was reversed by the agreement on Basel 1 in 1988, the downward trend in liquidity ratios was not. Some issues regarding the supervision of liquidity are discussed in Allen (2010) and Davies and Green (2010, pages 97-106).

⁹ Bagehot (1892, pages 199–200) emphasises the importance of speed in responding to panics.

This section begins by discussing possible multi- and bi-lateral techniques, before discussing unilateral actions that countries can take, including self-insurance by accumulating reserves. The range of possible techniques and their principal advantages and disadvantages are summarised in Table 2.

b. Multilateral techniques

All multilateral techniques involve a group of countries agreeing to make funds available to each other in case of need.

In reserve pooling schemes, participating countries can draw on the pool when they need funds, and can thereby have access to more funds than if there were no pooling. It is in the nature of reserve pooling that the reserves in question are not the liability of any of the participating countries. Pooled reserves could be used in a crisis to provide foreign currencies to banks in any of the participating countries. However, the advantage of pooling might be lost in a general liquidity crisis if most or all of the participating countries wanted to draw funds at the same time.

The Chiang Mai structure is a reserve pooling scheme in East Asia. In May 2009 the ASEAN-plus-three countries agreed to bring forward the timetable for multilateralising the Chiang Mai Initiative, which had until that time been a network of bilateral swap agreements, none of which had ever been drawn. The new multilateral facility created a pool of \$120 billion of reserves, from which each participating country could draw up to a predetermined country-specific amount¹⁰. With the two largest reserve-holding countries, China and Japan, among the participants, there is not much risk of all the participants wanting to draw at the same time.

The International Monetary Fund is a financial pooling scheme of a broader kind, in that member countries contribute their quota subscriptions mainly in their own currencies, but also partly in foreign exchange. Its lending is in part financed by quota subscriptions, and its resources have been augmented by borrowing, including borrowing under the General Arrangements to Borrow and the New Arrangements to Borrow. These resources can then be drawn on by member countries as foreign-currency loans. In addition, Special Drawing Rights issued by the IMF enable member countries to acquire usable currencies from other member countries in exchange for SDRs. The IMF can potentially recycle very large sums from creditor to debtor countries. IMF lending has been used in the past (e.g. during the Asian crisis of 1997–98) to help countries overcome the consequences of banking crises.

The official response to a financial crisis can be accelerated if credit lines which can be drawn on in case of need have been pre-agreed. The IMF's Flexible Credit Lines were set up

¹⁰ Only the first 20% of the committed amount is available unless the borrowing country meets conditions specified by the IMF.

in March 2009, in order to provide timely lending to economies with good economic fundamentals and policies, and without the conditionality (and associated stigma) associated with other forms of lending by the IMF. They are of finite (one or two year) duration, so as to limit moral hazard. Colombia, Mexico and Poland received credit lines in 2009, none of which had been drawn on, however, by May 2015.

Since the crisis of 2008-09, the resources available to the IMF have been massively increased, so as to give it the financial capacity to manage a future financial crisis on the scale of the recent one¹¹. It had been intended to double the quota subscriptions, but the United States Congress has thus far refused to ratify this measure, and at least until the doubling of quota subscriptions has been completed, the amounts available under the New Arrangements to Borrow have been increased from SDR 34 billion to SDR 367 billion. In 2012, as economic and financial conditions worsened in the euro area, a number of countries committed to increase IMF resources further through bilateral borrowing agreements. As of March 12, 2015, 33 agreements are now effective for \$369.3 billion. These resources will serve as a second line of defence to the IMF's quota and NAB resources. And the amount of SDRs in issue has been increased from SDR 21 billion to SDR 204 billion.

In 2014, the so-called BRICS countries (in this case, Brazil, Russia, India, China and South Africa) announced a swap network, totalling \$100bn. As in the case of the Chiang Mai Initiative, countries are required to have an IMF programme before they can draw more than a small percentage of the money.¹²

c. Bilateral techniques

Bilateral techniques involve one central bank accepting a commitment to provide funds on demand to foreign central banks. One possible bilateral solution to the problem of providing international liquidity assurance would be the institutionalisation of swap lines provided by individual central banks in their own currency.¹³

Bilateral central bank swap lines of this kind can provide adequate liquidity assurance. However they involve financial risks to the provider of funds; and there is the problem of how the recipient countries are chosen.¹⁴ Clearly the provider would make this latter decision, since the provider runs the financial risks, such as exposure to sovereign risk of the recipient country. But unrelated political issues might prevent economically-desirable outcomes in the choice of recipient countries.¹⁵ More generally, the liquidity-providing central bank would need to be able to argue convincingly to its own legislature that taking

¹¹ There are, however, serious doubts about whether the IMF has the decision-making capacity to manage a financial crisis (see Allen and Moessner, 2015).

¹² For a fuller review, see Eichengreen (2014).

¹³ Aizenman, Jinjark and Park (2010) discuss many of the issues discussed in this article and conclude that 'there are clear limits to substitutability between swaps and reserves'.

¹⁴ See Allen (2013, chapter 7).

¹⁵ A historical example of such political difficulties is provided by the negotiations in 1931 about an international loan to Austria after the collapse of Creditanstalt. See Toniolo (2005, chapter 4).

on a commitment of this kind was consistent with its statutory mandate and in the national interest. While it may be possible to make a compelling case for providing swap lines in an economic emergency on national interest grounds, a permanent commitment would be harder to justify¹⁶.

The swap lines which the Fed provided during 2007 and 2008 were allowed to lapse in February 2010. However, some of them were reopened later in 2010 in response to the sovereign debt crisis in Europe, and were used by the ECB (though to less effect than in 2008 – see Moessner and Allen, 2013). The duration of the Fed’s unlimited swap lines with the central banks of Canada, the UK, Switzerland, Japan and the ECB were extended *sine die* in October 2013. This was widely believed, though not publicly acknowledged, to be part of a contingency plan to manage a possible default by the US Treasury resulting from a hypothetical refusal of Congress to increase the Federal debt limit.¹⁷ It is not clear whether they would be available in any other contingency.

The People’s Bank of China has been active in extending swap lines to other countries since 2008, and the policy has continued since the financial crisis. Russia is China’s most recent swap partner.¹⁸ The main objective seems to be not to help manage a financial crisis, but rather to promote the use of the renmimbi in international trade. No information is available as to the usage of these swap lines. However, the fact that the PBOC made an announcement on 27th June 2014 of its first drawing on its swap line with the Bank of Korea, which had been set up in December 2008, suggests that there has not been much usage, at least on the part of China.¹⁹

A second bilateral technique is for an individual country to provide foreign-currency liquidity to another country out of its own foreign exchange reserves. For example, in 2008 the central banks of Denmark, Norway and Sweden provided euros to the Central Bank of Iceland by means of swap lines.²⁰ However, they had made no prior commitment to provide funds. Countries with large foreign exchange reserves could be in a position to provide foreign currencies to several countries, and might even make commitments to provide funds in case of future need, provided they were persuaded that such commitments were in their own interests and that the problem of moral hazard could be managed.

¹⁶ No doubt it was concerns of this kind that prevented the Basel Committee on Banking Supervision from making any co-operative contingency plans for emergency provision of international liquidity.

¹⁷ These swap lines are reciprocal, i.e. the Fed can draw foreign currencies if it wants to. The Fed also has a limited-amount swap line with the Bank of Mexico.

¹⁸ See

http://www.pbc.gov.cn/publish/english/955/2014/20141015162604364930184/20141015162604364930184_.html

¹⁹ See

http://www.pbc.gov.cn/publish/english/955/2014/20140630153458972282198/20140630153458972282198_.html

²⁰ See Allen (2013, chapter 6).

Cross-border collateral arrangements can also help to provide foreign currency liquidity. These involve the central bank in one jurisdiction providing domestic currency liquidity to eligible financial institutions against collateral placed by the latter's offices in another jurisdiction into the liquidity-providing central bank's account at the local central bank²¹. Strictly speaking, such arrangements do not increase the amount of foreign currency available to governments and central banks, but they do reduce the amounts of foreign currency that governments and central banks might need to provide in a crisis to banks located in their territory. Some central banks already accepted cross-border collateral in their normal operations or on an emergency-only basis before the recent crisis, including the central banks of Sweden, Switzerland, the United Kingdom and the United States (see CPSS 2006). Other central banks started accepting cross-border collateral during the crisis, as part of the widening of collateral accepted. For example, in June 2008, the Bank of Canada started accepting US Treasury securities held in the US as collateral for its Standing Liquidity Facility; and from October 2008 until March 2009, the Hong Kong Monetary Authority expanded the range of securities eligible as collateral for its Discount Window lending to include US dollar assets of credit quality acceptable to the HKMA.

d. Unilateral actions

If multilateral or bilateral structures do not provide countries with as much liquidity assurance as they desire, then they are likely to resort to unilateral actions. They can hold foreign exchange reserves which they can use in a crisis to provide foreign currency liquidity to domestic banks.

In the recent crisis, Korea, among other countries, provided US dollars to domestic banks out of its foreign exchange reserves in foreign exchange swap auctions, in addition to disbursing funds drawn on the Fed's US dollar swap line. And in Brazil, the central bank provided US dollars to domestic banks using instruments (derivatives such as foreign exchange swaps) that allowed it to limit the impact on reserves, and without drawing on its Fed swap line²².

Total world foreign exchange reserves fell temporarily during the crisis of 2008-09, but they have increased again since 2009 (Figure 1). Some countries which had fairly small reserves before the crisis and which experienced severe shortages of foreign currency liquidity during the crisis have more recently accumulated reserves for self-insurance purposes. For example, between the end of 2008 and the end of 2013, the dollar value of foreign exchange reserves increased by 106% in Denmark, by 120% in Sweden, by 69% in Poland, by 60% in the United Kingdom, by 81% in Brazil and by 67% in Korea (see Table 3). Some of the economies that relied on central bank swap lines during the crisis, such as Australia and the euro area, have not increased their reserves materially, however.

²¹ See Committee on the Global Financial System (2010).

²² See Committee on the Global Financial System (2010), Stone et al (2009).

Only a small part of the recent build-up of foreign exchange reserves has been motivated by self-insurance. For example, China's foreign exchange reserves were already \$1.9 trillion at the end of 2008, amply sufficient to provide self-insurance, and it is therefore unlikely that any of the further increase of about \$1.9 trillion between then and December 2014 can be attributed to any desire for additional self-insurance. And the very large increase in foreign exchange reserves in Switzerland (to nearly \$500 billion, or \$63,000 per head of population) has been the result of foreign exchange intervention by the Swiss National Bank, whose declared objective was (until it was abandoned early in 2015) to prevent a further appreciation of the Swiss franc against the euro beyond the minimum exchange rate of CHF 1.20 = EUR 1. Nevertheless during the crisis the Swiss National Bank had to provide dollar liquidity, which it drew from the Fed swap line, to commercial banks and the insurance that the recently acquired additional reserves provide, though incidental, may be welcome.²³

The advantages of self-insurance are that a country has reasonable certainty of access to foreign-currency liquidity, and that there is no need for co-ordination.²⁴ The drawbacks include the costs of holding foreign exchange reserves to the economy, as the funds held as reserves must be invested in liquid assets. Moreover, it may turn out that the amount of foreign-currency liquidity provided by the foreign exchange reserves is not sufficient.

3. Post-crisis reserve accumulation.

The decision that several countries have made to build up their reserves unilaterally following the experience of the financial crisis suggests that the enlargement of the resources available to the IMF has not provided complete reassurance about access to liquidity in case of need. It is worth considering why this might be.

Multilateral techniques for providing international liquidity were not much used during the recent crisis. There were no known drawings on the Chiang Mai facility, and east Asian central banks opened up new swap lines to each other during the crisis, rather than enhancing the Chiang Mai ones. The IMF's net disbursements in 2008 amounted to SDR 11.7 billion, which is roughly the equivalent of \$18 billion and of a smaller order of magnitude than the \$530 billion net which the Fed supplied on its swap lines in that year. The IMF's usable resources as at the end of August 2008, just before Lehman Brothers failed, were just \$257 billion²⁵. The IMF created new facilities in response to the crisis, namely the Flexible Credit Line and the Precautionary Credit Line, but they were not available until March 2009.

This experience shows that multilateral organizations were not able to react to the crisis on the scale and with the speed which the situation demanded. It does not imply any failure on the part of the people responsible for managing the Chiang Mai Initiative or the IMF. International organizations necessarily make decisions by agreement, and, faced with an

²³ See Allen and Moessner (2010).

²⁴ There is a risk of legal action in the jurisdiction in which the reserves are located, but the doctrine of sovereign immunity provides good protection in many jurisdictions.

²⁵ Source: IMF Financial Resources and Liquidity Position, August 2008, available at <http://www.imf.org/external/np/tre/liquid/2008/0808.htm>.

unexpected shock, they take time to reach the necessary shared understanding about what has changed and what needs to be done about it²⁶. Crucially, a national institution like the Fed can react more quickly than an international one like the IMF. In addition, the countries which form the membership of international institutions typically endow the institutions with the resources that they appear likely to need, but not more, and providing additional resources also takes time. The IMF did not have enough money in 2008 to enable it to provide liquidity on the same scale as the Fed did; nor did it have the necessary capacity to make quick decisions. In any future crisis, the now-enlarged IMF might have enough money to provide needed liquidity, but it cannot be assumed that the credit facilities which the IMF had available at the time would meet the need for liquidity, and the IMF would probably need more time than was available to design and agree new ones.

In these circumstances, it is not surprising that governments attach great value to the ability to have liquid assets immediately and unconditionally available under their own control, and that the post-2009 enlargement of the IMF's financial resources has not sufficed to prevent countries from building up their own accumulations of liquid assets. The attempt at co-operative provision of international emergency liquidity facilities can be said to have failed.

The Chinese authorities have implemented a number of measures to promote the internationalisation of the renminbi, including the swap lines mentioned above. Some people, e.g. Eichengreen (2012) and Prasad and Ye (2012), have speculated about the renminbi becoming a reserve currency and thus an additional potential source of international liquidity. And the possibility of including the Chinese renminbi among the currencies used to value the SDR has been widely discussed, perhaps as a means of inducing countries to hold more renminbi in their reserves than they would otherwise have chosen. Such a move might indeed cause central banks which are likely to feel obliged to accept SDRs in exchange for dollars to acquire more renminbi in order to hedge the associated liquidity risk (the amount of dollars they would have to supply in exchange for a given amount of SDRs would depend on the SDR/renminbi exchange rate). But they are likely to be very cautious. As Huang, Wang and Fen (2014) rightly point out, one of the most difficult obstacles to the renminbi becoming a reserve currency is the absence in China of an adequate legal structure. In particular, the fact that the judiciary is not independent of the executive is likely to deter central banks and governments from holding large amounts of reserve assets subject to the jurisdiction of China. Access to renminbi reserves is essentially at the government's pleasure. Inclusion of the renminbi in the SDR basket would therefore be a fairly empty gesture, and the prospects of the renminbi becoming a major reserve currency are remote.

There are signs that the accumulation of reserves slowed down or stopped altogether at the aggregate level in 2014 (see Figure 1). The immediate causes were, first, the reduction in inflows into Switzerland, which was followed early in 2015 by Switzerland's decision to allow the franc to float, and thereby ensure that it would not have to add any more to its already-

²⁶ The prolonged inability of the euro area to agree how to deal with sovereign debt problems in 2010-11 is a case in point.

enormous stock of foreign exchange reserves and the accompanying financial, and second, the increase in capital outflows from China. The fall in oil prices in 2015 is likely to reduce the rate at which oil-producing countries accumulate reserves. It is too soon to say whether the slowdown in reserve growth will be any more than temporary.

4. The global demand for liquidity

Thus governments and central banks have accumulated additional liquid assets since the crisis, partly in order to secure additional liquidity assurance. A coincident effort by a substantial number of countries to build up reserves is likely to affect the global macro-economic situation, as was the case when East Asian countries built up their foreign exchange reserves after the crisis of 1997–98.²⁷ Countries wishing to accumulate reserves may do so in any or all of the following ways:

- a. Outright purchases of foreign currency in exchange for domestic currency. This causes the exchange rate of the domestic currency to be weaker than it would otherwise have been, and switches expenditure away from foreign products towards domestic products²⁸. The policy may be accompanied by measures to restrain domestic demand. In any event, it depresses demand in the rest of the world.
- b. Borrowing foreign currencies at relatively long maturities in international bond markets so as to acquire short-term assets. Government debt is generally regarded as riskier when denominated in foreign currencies than when denominated in domestic currency. Such borrowing is likely to crowd out borrowing to finance productive investment and, by doing so, to depress both global demand and global productive capacity.

Thus reserve accumulation has negative effects on aggregate demand which are at least partly external to the reserve-accumulating country. It is likely that there has been more reserve accumulation globally than would have been socially optimal.

Unfortunately, the recent accumulation of reserves took place at a time when the demand for liquid assets from other participants in the global economy was also growing very strongly. The coincidence of increasing demand for liquid assets from a range of sources seems likely to have been very important in prolonging the global recession and retarding recovery.

Banks in particular have had to increase their liquid asset holdings massively. In the pre-crisis decades after banking began to be deregulated in the 1970s, banks were able increasingly to meet their needs for liquidity by borrowing in wholesale deposit markets. Banks with good

²⁷ See Bernanke (2005) for an analysis of the effects.

²⁸ See Johnson (1958).

names were able to borrow large amounts quickly and easily in these markets, and their holdings of liquid assets fell. The practice of 'liability management' meant that banks could choose within quite a wide range what quantity of assets they wanted to hold, confident that they would be able to raise the necessary liabilities.

After the financial crisis, liability management became much more difficult for most banks; and the Basel 3 liquidity requirements will make it permanently more difficult for all banks. The Liquidity Coverage Ratio has been introduced in 2015 with a 60% requirement, and will become fully effective in 2019; in practice it is already having a powerful influence on bank behaviour. It will require banks to hold sufficient prescribed liquid assets to enable them to withstand for a month a hypothetical stressed situation in which it is assumed that no inter-bank deposits are rolled over. Thus banks will have to hold 100% liquid assets against inter-bank deposit liabilities²⁹. Inter-bank borrowing with a maturity of a month or less will be largely pointless, and inter-bank borrowing for more than a month will not yield any usable liquidity in the last month before maturity.

Banks therefore need to acquire additional liquid assets, not just to meet the Basel 3 minimum requirements, but also to enable them to manage fluctuations in their cash flows as well as to provide reassurance to their own newly-anxious directors and shareholders. They have done so by competing aggressively for retail deposits and by issuing longer-term debt. Market reports (e.g. Bank of England 2011, paragraph 3) suggest that banks were facing serious funding problems in September 2011.

Non-financial companies are also likely to need more liquid assets. The Liquidity Coverage Ratio will require banks also to hold increased liquid asset cover against undrawn lending commitments. This has increased the cost to non-bank companies of maintaining bank facilities as a source of liquidity, and reduced the availability of such facilities. As a result, those companies, too, have needed to build up larger stocks of liquid assets as an alternative means of managing their cash flows.

Thus the global demand for liquid assets has been greatly intensified as a result of the crisis, partly as a result of official regulation, which affects banks directly and non-financial companies indirectly, and partly as a result of decisions by national governments and central banks to acquire additional liquid official foreign exchange reserves.

This surge in the global demand for liquidity is certain to have had large though unmeasurable macro-economic consequences. While it has been in progress, the ability of banks to supply credit has been inhibited by their need to build up liquid assets and repay official emergency financing provided during the crisis. And demand to borrow in longer-term credit markets has been amplified by banks needing to secure longer-term funding, corporates seeking alternatives to bank borrowing and governments financing the acquisition of liquid foreign exchange reserves. Low official interest rates may not offset high borrowing spreads and limited availability of credit, but in a low-interest rate environment,

²⁹ See Basel Committee on Banking Supervision (2013).

the demand for long-dated fixed income assets has been very strong (and has been increased further by regulation of defined benefit pension funds in the European Union), so that creditworthy governments have been able to borrow extremely cheaply.

Macro-economic policy management now needs to take much more account than in the past of the supply and demand for liquid assets - a procedure that has been unfamiliar since quantitative controls on bank balance sheet growth were abandoned in the 1970s and 1980s. The objective of the controls then was to restrain the growth of money and credit as a means of containing inflation. In current circumstances, however, there is a risk that economic growth will be insufficient to enable the overhang of excessive debts to be worked off and repaid. In this unusual environment, macro-prudential policy needs to be ready not only to restrain risk-taking but sometimes to encourage it, with the intention of ensuring that growth is not obstructed by the surge in demand for liquid assets³⁰. The tools of macro-prudential policy have not been precisely defined, but it seems likely that they will need to include the ability to supply liquidity to financial markets, and that they will need to be directed to much the same objectives as those of macro-economic policy in the immediate future. Thus, for example, public debt management has once more become an important instrument of national macro-economic policies³¹. And the definition of 'liquid assets' for regulatory purposes should be widened to include high-quality short-term commercial assets as well as government securities. It is of course true that commercial assets carry some credit risk, but recent events have shown that the same is true of government securities, even in the United States, where the Congress has repeatedly threatened to refuse to increase the Federal debt limit and put the U.S. Treasury into a position in which it would be very difficult not to default on Federal debt.

The world financial structure is therefore in a vulnerable situation. A new liquidity crisis can never be ruled out. There is no reliable 'lender of last resort': the United States performed that role admirably in 2008-09 but might not do so again. Countries, recognizing this fact, have prepared themselves for *saive qui peut*, and those which can have augmented their foreign exchange reserves to protect themselves. At the same time, the chronic latent instability of the euro area has led to capital flight and to enormous and unwanted increases in the foreign exchange reserves of Switzerland, and more recently and on a smaller scale, Denmark. There is no international monetary system in the sense that there is no international management of international liquidity, and no accepted rules or conventions on exchange rate policy or reserve management; moreover there is very little co-operation on these subjects. What remains is the debris left behind by a series of unsuccessful experiments and at least one intractable crisis which poses a dangerous threat to global financial stability.

³⁰ For a review of the literature on macro-prudential policies, see Galati and Moessner (2013). For a similar view on what the current priorities for macro-prudential policy should be, see Haldane (2011).

³¹ 'Quantitative easing' as practised in the UK is most naturally seen as a form of public debt management, and the Federal Open Market committee has decided to implement a new 'Operation Twist' (see minutes of Federal Open Market Committee meeting of September 20 – 21, 2011, available at <http://www.federalreserve.gov/newsevents/press/monetary/fomcminutes20110921.pdf>). See also Turner (2011).

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Table 1: Large foreign exchange reserve holdings, end of 2013.

Country	Foreign exchange reserves (\$ bn, end-2013)	% of world total	% of GDP
China	3,821	36	40
Japan	1,204	11	24
Saudi Arabia	710	7	95
Switzerland	488	5	71
Russia	456	4	22
Taiwan	416	4	82
Brazil	349	3	15
Korea	336	3	26
Hong Kong	311	3	113
India	268	3	14
Euro area	222	2	2
Mexico	169	2	13
Thailand	159	2	41
Turkey	109	1	13
Poland	99	1	19
Indonesia	93	1	10
Denmark	82	1	25
Israel	82	1	28
Philippines	74	1	27
United Kingdom	66	1	2
Peru	63	1	31
Canada	58	1	3
Norway	55	1	11
Sweden	55	1	10
Czech Republic	54	1	26
Others	921	9	

Source: IMF, Central Bank of the Republic of China (Taiwan).

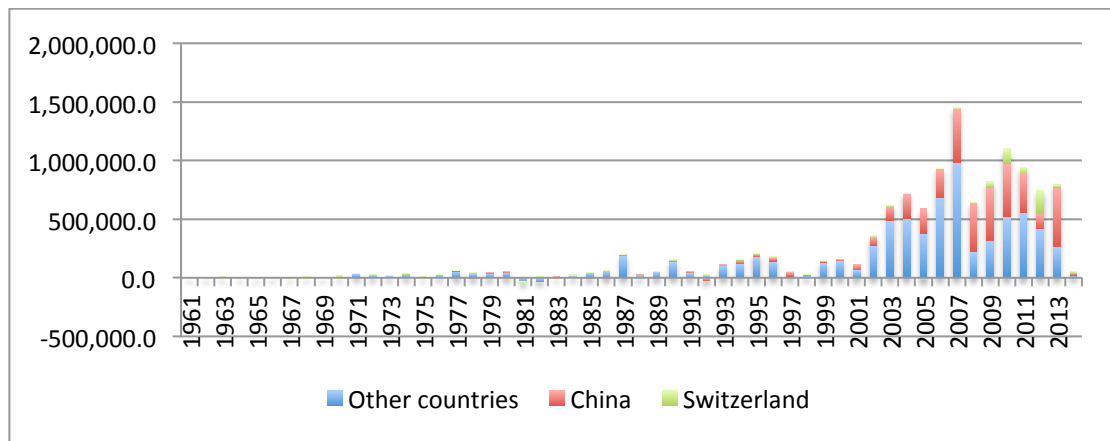
Table 2: Techniques for providing liquidity assurance

Type	Technique	Example	Advantages	Disadvantages
Multilateral	Reserve pooling	Chiang Mai	Economy in reserve holding	Moral hazard and possible delays Not all participants can draw at the same time
	Pooling including own currency	IMF	Economy in reserve holding	Moral hazard and possible delays
Bilateral	Swap network managed by reserve-currency country	Fed, 1962–98 Fed, from December 2007	Quick access to funds assured Economy in reserve holding; requires only bilateral negotiations	Moral hazard Choice of recipient countries Burden on provider of funds
	Individual country lending from own FX reserves	Denmark, Norway, Sweden lending to Iceland, 2008	Requires only bilateral negotiation	Moral hazard and possible delays Provision of funds may not be assured
	Central banks accept foreign currency collateral located outside home territory from commercial banks	Canada, Hong Kong, 2008	Requires no international negotiation	Not likely to be enough on its own
Unilateral	Reserve accumulation for self-insurance	East Asian countries after crisis of 1997–98. Several European countries post-2008 (see text).	Requires no international negotiation. Quick access to funds assured	Diversion of resources into low-yielding assets. Global macro-economic consequences of reserve accumulation

Table 3: Large increases in foreign exchange reserves end-2008 to end 2013 (\$ billions)

Country	Increase in foreign exchange reserves	
	\$ bn	%
China	1,875	96
Switzerland	444	1,004
Saudi Arabia	270	61
Japan	206	21
Brazil	156	81
Hong Kong	147	89
Korea	135	67
Taiwan	125	43
Mexico	75	79
Thailand	51	47
Russia	46	11
Indonesia	44	89
Denmark	42	106
Philippines	41	123
Poland	40	69
Turkey	38	54
Israel	38	90
Peru	33	109
Sweden	30	120
United Kingdom	25	60
India	21	9
Euro area	20	10
Total	4,174	25.4
<p>Note: countries are included in the table of their foreign exchange reserves increased by \$20 billion or more between the end of 2008 and the end of 2013. Source: IMF International Financial Statistics.</p>		

Figure 1: Year-to-year changes in global foreign exchange reserves 1961 - 2014 (\$mn, unadjusted for exchange rate changes).



Source: International Monetary Fund [International Financial Statistics](#).