# Managing foreign exchange reserves in the crisis and after

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## 1. Introduction

The recent global financial crisis has posed a great challenge to official foreign exchange reserve managers. Events brutally reminded them of the original *raison d'être* of foreign exchange reserves, namely to deal with emergencies. Reserve managers faced the possibility of a need to mobilise rapidly funds in liquidity portfolios, and even investment portfolios, to meet the foreign currency needs of domestic banks (and in some places firms) or to support the foreign exchange value of the domestic currency. At the same time, the most common short-term placements, namely bank deposits, came into question as write-downs of asset-backed securities burned through bank equity and interbank funding liquidity dried up. And then the failure of Lehman Brothers exposed risks in repo and money market mutual funds, in which some central banks had invested. While central banks struggled with manifold challenges to their management of short-term funds, their losses on longer-term investments in private asset-backed securities – the securities that set the crisis in motion – sometimes showed up in surprising places, but appear to have been neither widespread nor large.

Accordingly, official reserve managers reacted most immediately in the management of their short-term portfolios. Judging from data on US dollar portfolios, they reversed the long-standing tendency to hold a greater share of short-term funds in riskier placements, especially with banks, and sought refuge in the quality of US Treasury bills and central bank liabilities. Many withdrew from or cut back on their participation in securities lending programmes, under which cash raised against securities of the highest quality turned out to have often been invested in lower-quality and less liquid securities.

Among longer-term holdings, official reserve managers' banks reversed their long-standing diversification into US agency securities, starting several months before the US authorities took over Fannie Mae and Freddie Mac in early September 2008. Central banks bought agencies on the supposition of official support, and then sold as the Treasury in fact provided support and the reputation of agencies suffered. Official holdings of agency mortgage-backed securities have held up much better than holdings of agency debentures. In contrast, among holdings of US corporate bonds, reserve managers now hold many fewer asset-backed bonds, while broadly maintaining their modest holdings of straight corporate bonds.

These developments raise the question of whether the searing experience of 2007–09 will prove to have stopped the trends towards greater acceptance of credit, market liquidity and duration risk by official reserve managers. It should be recalled that the need on the part of many reserve managers to mobilise resources was limited by the central bank swaps. These financed provision of foreign currency funding to commercial banks. Central banks must consider coping with such calls on their foreign exchange reserves in the absence of such

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swaps. Nevertheless, the crisis may in retrospect represent more a temporary reversal or pause in reserve management trends than any enduring reversal of them.

This paper starts by sketching the investment by maturity and instrument of official portfolios as of mid-2007, focusing *faute de mieux* on the identified instrument composition of the US dollar portfolio of official reserve holders. The next section describes the challenges and responses from mid-2007 to mid-2008, and the following section those since the Lehman failure. The focus is on the data as of end-June because the US authorities' annual surveys drill down through layers of custodians once a year to produce better-quality data than captured in monthly reports. (This means that the most recent data on the period since mid-2010 can support only tentative generalisations.[2]) The following section reports the valuation gains and losses experienced by official reserve portfolios in US securities, which suggest that both US Treasury and agency securities served as rainy-day portfolios. The penultimate section poses five questions on the lessons reserve managers appear to be taking regarding their investments. The final section concludes.

## 2. Maturity and instrument composition in mid-2007

Official reserve management by mid-2007 had come a long way from the choice between Treasury bills and bank deposits faced by an earlier generation (Table 1, upper panel).[3] Identified US dollar reserves[4] were 70% invested in securities of over one year original maturity. US Treasury securities still represented the largest single holding, but had fallen to less than half of the identified portfolio overall. US agency paper had risen to half the level of Treasuries. In the short-term portion of the portfolio, bank deposits had long surpassed Treasury bills. Treasury bills stood at only 15% of short-term holdings, and less than 5% of overall holdings. Official reserve managers, like most households, kept their cash in the bank. This was not your grandfather's or even your father's reserve management.

It does not appear that the official dollar liquidity portfolio had come to be invested to any significant extent in the "shadow banking system". This term refers to non-bank financial institutions that funded themselves with open market paper or reverse repos and held securitised assets (Pozsar, et al (2010)). For instance, money market funds bought asset-backed commercial paper funding securities investment vehicles (SIVs) that held asset-backed securities (ABS). There were reports of some official investment in US dollar money market funds domiciled outside the United States (and thus not captured in Table 1). But reported official holdings of commercial paper, including asset-backed commercial paper, remained very modest. Reported official holdings of longer-term corporate asset-backed securities (mostly private label mortgage-backed securities, but also credit card- and auto loan-backed securities) amounted to $44 billion in mid-2007. Some of this sum might have come from official liquidity portfolios.[5] But unmeasured money fund holdings, measured commercial paper holdings and some asset-backed bonds together, perhaps aggregating

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[2] See Warnock (2010), Figure 3, page 6 on the hazards of drawing inferences from the monthly Treasury International Capital data.

[3] See Fung and McCauley (2003) for a longer view. De Kock (2010, p 19) analyses dollar holdings in the US.

[4] While the survey data drill down with custodians to identify ultimate beneficial owners, official holdings are probably still understated owing to layers of holdings (Bertaut et al (2006)). However, the largest lacuna is central bank holdings of US dollar bonds issued, and held in custody, outside the United States by top-rated sovereigns like Sweden and Austria and agencies like KfW, CADES and export agencies. These are not captured in the Treasury survey, and their inclusion would tend to lower the share of US Treasuries.

[5] These are included in long-term holdings of corporate bonds. See Table 7 below.

into the tens of billions of dollars, left the official liquidity portfolio overwhelmingly placed with banks at the outset of the crisis.[6]

Box A

**Securities lending programmes**

In order to raise returns in their investment portfolios, official reserve managers, like other institutional investors, contracted with agents to lend out their securities. As was argued by one of the largest custodians, such securities lending can contribute to the liquidity and efficiency of securities markets (State Street (2001)). Indeed, with a rising fraction of Treasury securities held by official reserve managers, the Federal Reserve Bank of New York encouraged official lending of securities and participation in repurchase markets in which cash is exchanged against securities.

The predominant model in securities lending as it developed in the first decade of the century is an integrated approach in which the custodian serves as agent for the securities lending and invests the cash raised. A client empowers the agent to lend to specified counterparties up to a specified fraction of the designated portfolio and to take specified securities as collateral or to invest cash in specified instruments. The agent typically provides indemnities against the failure of any counterparty to return the security.

Securities can be lent out against securities or cash collateral. When they are lent out against cash, the cash can be invested in reverse repos. In this case, a security lent is ultimately secured by a different security borrowed, and the return arises from the difference in the scarcity or the creditworthiness of the two securities. Alternatively, the agent can invest the cash received against borrowed securities in money market investments. In this case, the question arose of the quality, liquidity and maturity of the money market investments. As State Street (2001, p 19), noted:

> When cash is pledged as collateral, the general practice is to re-invest it in short-term, money-market instruments, because securities lenders have to price, purchase, sell and settle on a daily basis and holding any illiquid instrument in a short-term fund would be excessively risky.

The major securities lenders were said to differ in terms of how bespoke or pooled their cash investments were. Some agents worked with the lender on the parameters for a segregated account for all but the smallest lending programmes. This has the disadvantage of not getting the liquidity benefits of pooling. Other agents gave clients a choice of commingled pools, ranging in riskiness from low (government securities) to medium ("prime funds" invested in commercial paper and bank certificates of deposit with maturity limits similar those permitted by the SEC for so-called 2a-7 money market funds) to "enhanced" funds (investing outside such credit and maturity parameters). Even in the latter case, larger clients or those in special tax positions might have their cash investments segregated.

[6] Thus, it appears that official reserve managers did not fall into the trap that caught UBS. According to UBS (2008), this bank turned a $25–$30 billion portion of its "liquidity buffer or reserve" portfolio into a profit centre in 2002–03. Ironically, the investment in AAA- and AA-rated asset-backed securities, mostly US originated, followed the bank's internal (credit risk control) downgrading of Japanese government bonds in which much of the portfolio had been invested. It was argued (ibid, p 16) at the time that the asset-backed securities qualified for a liquidity buffer because they were highly rated, repo-able and could be pledged at a major central bank. Small trading spreads, dollar denomination and, of course, positive carry were seen as pluses. Risk control's review (p 32) faulted putting the maintenance of the liquidity buffer in a profit centre accompanied by "no decision to forego some level of profit to ensure that the Group's liquidity reserve was *fully capable of liquidation in any event and at any time*" [emphasis added]. Also cited was "considerable reliance" on ratings and concentration limits that did not flag that 95% of the underlying assets were US assets, as well as a lack of granular data available to risk control regarding vintage, loan-to-value ratios and mortgage borrower credit scores. In the event, this portfolio of asset-backed securities not only lost value but also suffered impaired market liquidity precisely when UBS's own funding liquidity came under stress.

Box A (cont)

**Securities lending programmes**

What might not be apparent at first blush is that, to lend securities against cash and to invest the cash, is to leverage the portfolio. The yield of high-quality securities can be enhanced by lending those in short supply against similar, readily available securities. More incremental yield is available from lending cash taken in exchange for securities. Then, more than 100% of the portfolio is invested.

It appears that many institutional investors, including central banks, did not exercise the same care in specifying how the cash raised by securities lending might be invested as they would in managing their "own" cash.[①] Interviews suggest at least three different reasons for this. First, securities lending often started as an initiative of operations groups to harvest the return available by lending securities in short supply ("specials"). This gave the whole enterprise a frame of "free money" arising from securities markets' technical factors. Second, the notion of a guarantee by the securities lender may have reassured management that risks were more contained than they really were. As noted, the agent in the securities lending programmes often undertook to indemnify the security lender in the event of the failure of the security borrowers. But any indemnity against the failure of a counterparty to return the security (at the front end of the deal) did not extend to any guarantee on the securities in which cash might be invested (the back end). Third, there was apparently an incremental deterioration of the securities in which cash was invested, much as there was a progressive decline in the quality of securities accepted in the repo market (Gorton (2010, p 43)).

As a result, qualified investments for cash might be broadly characterised and the specific investments not even regularly communicated by the agent. For instance, qualifying securities might be any carrying an AAA or AA long-term rating or an A1/P1 short-term rating, or eligible for repo at the ECB. Moreover, average maturity might have been specified, allowing longer-term investments.

Or consent might be given to invest the funds in one of three or four available pooled investments, which itself might change in character over time. One interviewee reported that, when returns rose in late 2007 and the agent was asked to produce a list of current investments, the response was unreassuringly slow.

Thus, when cash was raised against the securities and then invested, holdings of very liquid securities inadvertently became investments in what could and did become very illiquid securities in stressed markets. To the extent that high-quality government securities were lent out and credit risk accepted in the portfolio, returns arose from so-called maturity and liquidity mismatches. While senior management might have signed off on a programme to exploit temporary supply shortages, yield (and risk) could end up arising from leverage, credit exposure ("credit arbitrage") and maturity and liquidity mismatches.

In retrospect, it is easy to see the risks inherent in not vetting the investments of cash collateral as much as investments in the liquidity portfolio. Even at the time, though, the Basel-based Committee on the Global Financial System (CGFS (2005)) warned:

> "[…] Despite the "value added" by the rating agencies, market participants need to be aware of the limitations of ratings. This applies, in particular, to structured finance and the fact that, due to tranching and the effects of default correlation, the one-dimensional nature of credit ratings based on expected loss or probability of default is not an adequate metric to fully gauge the riskiness of these instruments... As the unexpected loss properties of structured finance products tend to differ significantly from those of traditional credit portfolios or individual credit exposures, structured finance tranches can be significantly riskier than portfolios with identical weighted average ratings".

Such investments of cash collateral received in securities lending programmes appear not to have been well captured in the US Treasury/Federal Reserve or BIS data compiled in Table 1. As a result, it is very hard to put a number on the scale of official investment in cash collateral investments, whether bespoke or pooled.

Box A (cont)

**Securities lending programmes**

The Central Bank of Norway, which sets a standard for disclosure by official portfolios, provides a point of reference on magnitude. Of the total net assets of NOK 2.019 trillion at end-2007 (the first date for which data on security lending were made available), the Government Pension Fund had lent out NOK 516 billion (26%). Most of this was lent against cash (NOK 298 billion) and the rest directly against securities. Much of the cash, however, was lent out through reverse repo (NOK 201 billion), and so to this extent securities were lent indirectly against securities. In the end, only NOK 93 billion was held in fixed income instruments. Thus, cash had been raised against 15% of the overall portfolio, and cash collateral investments represented 5% of the portfolio.

If these proportions were representative of official reserve managers, then cash collateral investments by central banks would have amounted to $200–300 billion in June 2007. Of course, the Norwegian fund is a very unusual official investor, both in the securities it holds and in its risk appetite, and there is reason to believe that it is not representative of official investors. As a result, it could have been doing more than its share of securities lending (especially since the central bank carries the country's liquidity portfolio). However, its heavy reliance on securities collateral and cash investment in reverse repo might mean that other central banks ended up investing more of the proceeds of their securities lending in risky cash investments.

Market sources suggest that, after a sharp cut-back during the crisis, a number of central banks have returned to lending their securities.7 Central banks had reportedly lent securities to the extent of about $340 billion in August 2008. These were cut back in the following month by about a third, and amounts lent bottomed out at about $150 billion in the first half of 2009. Reportedly, amounts lent out recovered to as much as $200 billion by mid-2011.

Central banks that have returned to securities lending have tended to change their approach in the light of the crisis experience. Investments of cash are the concern not only of the back-office that deals with the custodians but also the front office that allocates funds to investment. Thus, such cash is invested in instruments meeting the usual credit, maturity and liquidity standards under limits set by risk control. Cash investments are more likely to be in bespoke rather than pooled investments. And reporting is more systematic than before the crisis.

[①] This case should not be confused with that of AIG, which raised cash with the securities of its insurance affiliates and itself invested in residential mortgage-backed securities, some of which ended up in the Federal Reserve Bank of New York portfolio, Maiden Lane II. See Kohn (2009).

If central banks avoided the trap of investing their own liquidity portfolios in untested securities and commercial paper backed by such securities, many faced similar challenges in outsourced liquidity management associated with securities lending programmes. While the short-term portfolio just reviewed reflected explicit choices by official reserve managers to invest their own portfolios, another set of money market positions arose more incidentally. And these more incidental cash holdings were apparently often left to agents to invest with a considerable reliance on ratings or other rules of thumb (see Box A). As a result, official reserve managers entered the shadow banking system as it were by the back door, with high quality securities that produced cash that was in some cases invested in surprisingly low quality securities.

7 The underlying source for such market estimates are reports from custodians aggregated by Data Explorers in London. However, some central banks are said to be reluctant to have their securities lending identified as originating in central banks even in the absence of identification by name, so there may be a downward bias in such estimates.

Table 1

**Instrument composition of official holdings of US dollars**

In billion of US dollars

| End-June 2007 | Short-term | Long-term | Total |
|---|---|---|---|
| Treasury securities | 159 | 1,452 | 1,611 |
| Other assets | 941 | 1,115 | 2,056 |
| Repos and deposits in the United States | 237 | | |
| Commercial paper and certificates of deposit in the United States | 27 | | |
| Offshore deposits | 597 | | |
| Agency securities | 80 | 750 | 830 |
| (ABS) | | (236) | |
| (Other) | | (515) | |
| Corporate bonds | | 99 | |
| Equities | | 266 | |
| Total | 1,100 (30%) | 2,567 (70%) | 3,667 (100%) |
| *Memo: Share of Treasury securities in identified assets of the given maturity* | *15%* | *57%* | *43%* |
| *Total IMF-reported US dollar reserves* | | | *1,999* |
| **End-June 2008** | **Short-term** | **Long-term** | **Total** |
| Treasury securities | 226 | 1,684 | 1,910 |
| Other assets | 871 | 1,435 | 2,306 |
| Repos and deposits in the United States | 199 | | |
| Commercial paper and certificates of deposit in the United States | 23 | | |
| Offshore deposits | 519 | | |
| Agency securities | 130 | 967 | 1097 |
| (ABS) | | (435) | |
| (Other) | | (532) | |
| Corporate bonds | | 105 | |
| Equities | | 363 | |
| Total | 1,097 (28%) | 3,119 (72%) | 4,216 (100%) |
| *Memo: Share of Treasury securities in identified assets of the given maturity* | *21%* | *54%* | *45%* |
| *Total IMF-*reported *US dollar reserves* | | | *2,782* |

Table 1 (cont)

**Instrument composition of official holdings of US dollars**

In billion of US dollars

| End-June 2009 | Short-term | Long-term | Total |
|---|---|---|---|
| Treasury securities | 575 | 2,117 | 2,692 |
| Other assets | 573 | 1,212 | 1,785 |
| Repos in the United States | 102 | | |
| Deposits, brokerage balances and others in US | 64 | | |
| Commercial paper and certificates of deposit in the United States | 43 | | |
| Offshore deposits | 330 | | |
| Agency securities | 34 | 794 | 828 |
| (ABS) | | 475 | |
| (Other) | | 320 | |
| Corporate bonds | | 107 | |
| Equities | | 311 | |
| Total | 1,148 (25.6%) | 3,329 (74.4%) | 4,477 (100%) |
| *Memo: Share of Treasury securities in identified assets of the given maturity* | *50.1%* | *63.6%* | *60.1%* |
| *Total IMF-reported US dollar reserves* | | | *2,682* |
| **End-June 2010** | **Short-term** | **Long-term** | **Total** |
| Treasury securities | 454 | 2,592 | 3,046 |
| Other assets | 457 | 1,223 | 1,680 |
| Repos in the United States | 90 | | |
| Deposits, brokerage balances and others in US | 55 | | |
| Commercial paper and certificates of deposit in the United States | 30 | | |
| Offshore deposits | 255 | | |
| Agency securities | 27 | 714 | 741 |
| (ABS) | | 443 | |
| (Other) | | 271 | |

Table 1 (cont)

**Instrument composition of official holdings of US dollars**

In billion of US dollars

| End-June 20010 | Short-term | Long-term | Total |
|---|---|---|---|
| Corporate bonds | | 83 | |
| Equities | | 426 | |
| Total | 911<br>(19%) | 3,815<br>(81%) | 4,726<br>(100%) |
| *Memo: Share of Treasury securities in identified assets of the given maturity* | *50%* | *68%* | |
| *Total IMF-reported US dollar reserves* | | | *2,995* |

Figures for US Treasury, agency and corporate bonds and equities are from US Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System, *Report on foreign portfolio holdings of U.S. securities as of June 30 2007* (April 2008), *June 30, 2008* (April 2009) and *June 30, 2009* (April 2010) and US Treasury, *Preliminary report on foreign holdings of U.S. securities at end-June 2010* (28 February 2011). Figures for deposits and money market paper in the United States are from BEA, International Transactions Table 5 (or the US *Treasury Bulletin*, Tables CM-I-1 and IFS-2). Figures for offshore US dollar deposits are estimated from the BIS *Quarterly Review*, Table 5C, and the Japanese SDDS. The US Treasury definition of official institutions, including "national government-sponsored investment funds", may be broader than those of the BIS and IMF. Long-term is defined by original maturity. IMF data from COFER.

In managing the predominant longer-term portfolio, reserve managers had reached for yield by substituting agency bonds for Treasuries. The agencies had accommodated central banks' demand for more tractable instruments with bullets and callable instruments ("other" in Table 1). Holdings of corporate bonds and equities were modest and concentrated.

## 3. Evolution of holdings from mid-2007 to mid-2008

Five developments stand out in this period, three concerning the short-term portfolio and the other two concerning the longer-term investment portfolio. The most notable development is that official reserve managers shifted cash away from unsecured deposits with commercial banks towards Treasury and agency bills.

### 3.1 Developments in the short-term portfolio

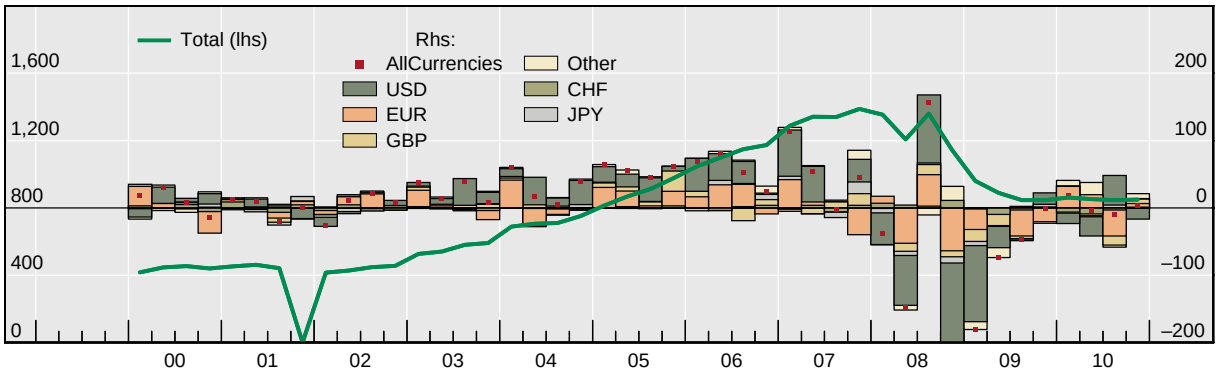
The three shifts in the short-term portfolio in this period all responded to the felt need to reduce the risk profile. Official reserve managers placed maturing bank deposits in sovereign paper, invested with central banks and cut back on often unappreciated risks in their security lending programmes.

Data reported by banks, aggregated nationally and collated by the BIS, show that reserve managers reacted in steps to the succession of bad news regarding bank losses. Overall official deposits in banks peaked in the last quarter of 2007 (Graph 1). Officials continued to reduce their deposits with banks well into 2009.

Graph 1

**Bank liabilities to official monetary authorities by currency**[1]

In billions of US dollars




[1] Liabilities booked by BIS reporting banks vis-à-vis official monetary authorities; expressed at constant Q4 2010 exchange rates. Green line relates to total amount outstanding; bars and dots relate to exchange rate and break adjusted changes in amount outstanding.

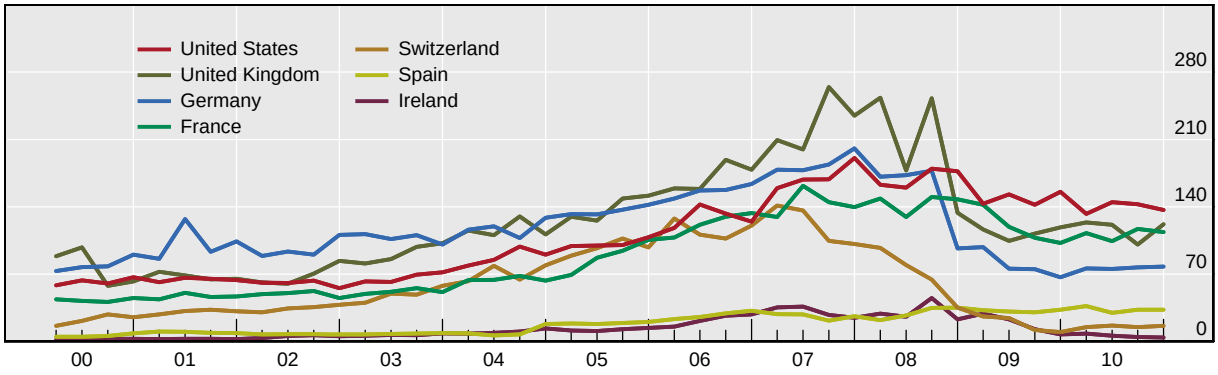
Sources: BIS locational banking by residence statistics; BIS calculations.

Thus, unlike US money market mutual funds, the largest non-bank providers of dollars to banks, official reserve managers ran down their deposits over quarters rather than weeks.[8] Reserve managers also drew distinctions as they backed away from banks. Already in the third quarter of 2007, official deposits in Swiss banks (in all currencies) started to decline and then they took a big step down in the fourth quarter (Graph 2). This backpedalling from bank risk spread in the following quarters to French, then German and US banks and finally to UK banks.

Graph 2

**Liabilities to official monetary authorities by bank nationality**[1]

Amounts outstanding, in billions of US dollars




[1] Liabilities booked by BIS reporting banks vis-à-vis official monetary authorities; expressed at constant end-Q4 2010 exchange rates.

Sources: BIS locational banking statistics by nationality; BIS calculations.

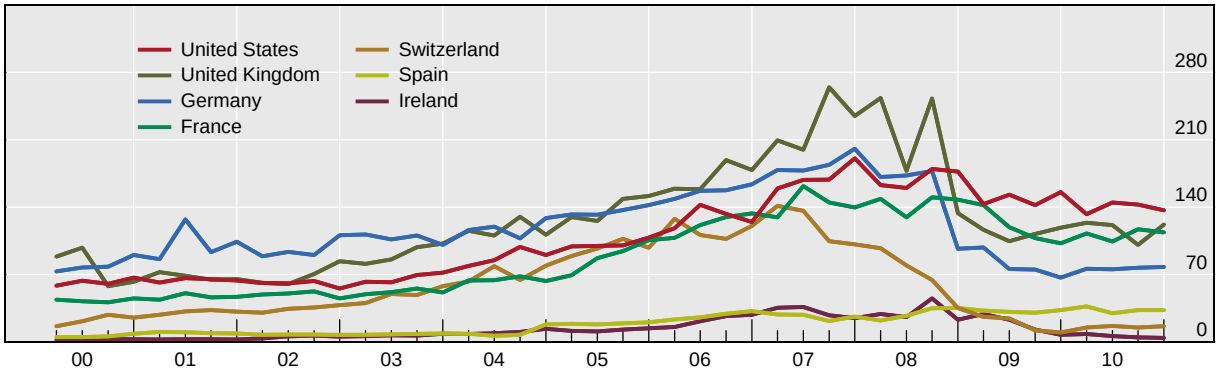
[8] US dollar money market funds kept ramping up the supply of funds to mostly European banks until the Lehman Brothers default, when they responded to a run by shareholders by pulling hundreds of billions of dollars out of banks in a matter of weeks. See Baba et al (2009) and Graph 5, below.

Focusing exclusively on US dollar deposits, the picture looks much the same, although the deposits in US banks now emerge as more clearly favoured (Graph 3). On balance, US and Spanish banks gained market share in official dollar deposits during the financial crisis.

Graph 3

**US dollar-denominated liabilities outstanding to official monetary authorities**

By bank nationality; amounts outstanding; in billions of US dollars




Source: BIS locational banking by nationality statistics.

As central banks cut their holdings of bank deposits, they returned to the safety of sovereign and semi-sovereign paper. Among dollar holdings of less than one year original maturity, the share of Treasury bills rose in the 12 months to June 2008 after years of decline. In particular, the Treasury bill share of measured short-term dollar holdings had fallen from about 40% in 1989 to about 15% in mid-2007, only to rise to 21% in mid-2008 (Table 1, middle panel). Reserve managers also took refuge in the presumed safety of agency bills.

The second development in official cash management was increased placements with official sector institutions (Graph 4). This sector includes the BIS and central banks. In Box B we discuss how the BIS did not increase its acceptance of funds – on the contrary, it reduced them. Some central banks of top-rated countries decided to step in and to play the credit intermediation role that private financial institutions were no longer able to fulfil. The central banks that received these flight-to-quality funds from official investors placed the proceeds to some extent in sovereign obligations and to some extent in banks, albeit reportedly on a secured basis.

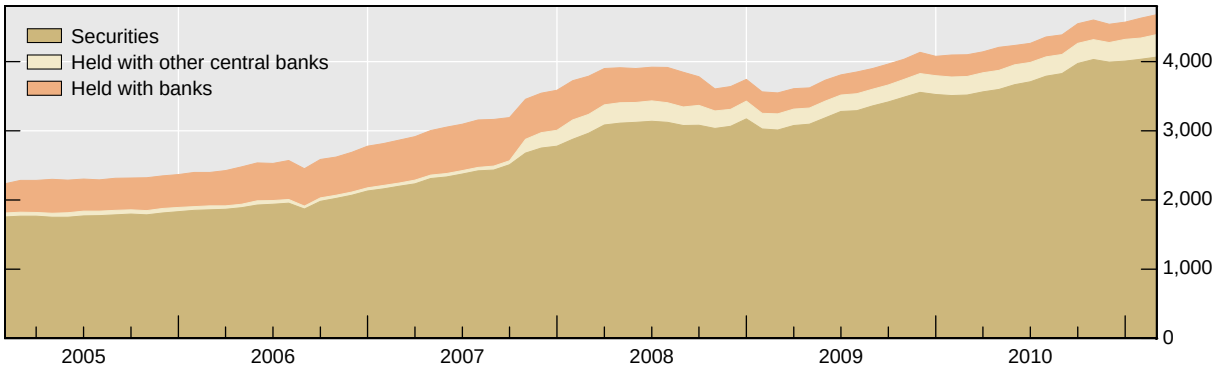
A third development in cash management was the early reduction by some official reserve managers of lending of their securities. For some, this reduction intended to make reserve holdings more readily mobilised, as they anticipated market strains. For others it was signs of strain in securities lending programmes themselves that led to their scaling back lending. Such programmes had often been marketed to operations departments as “free money”, producing an incremental yield by lending out securities against cash and investing the proceeds in pools of purportedly safe securities. With credit risk controls on invested cash often not as exacting as those applied to the own portfolio, official investors had inadvertently entered into the shadow banking system.

Setting a standard for transparency, Norway disclosed problems at end-2007. About half of the NOK 93 billion in cash collateral investments at that time was invested in asset-backed securities and an eighth in structured investment vehicles (NBIM (2008a, p 64). Write-downs of NOK 3 billion exceeded interest earnings of half that amount.

Graph 4

**Foreign exchange reserves by broad instrument**[1]

In billions of US dollars




[1] Holdings of foreign exchange reserves by 63 monetary authorities that report SDDS data to the IMF.

Source: IMF SDDS.

Unanticipated results in the cash collateral investment led some central banks to tighten their collateral and investment criteria and to re-examine their participation in securities lending programmes even before the Bear Stearns collapse. Part of the securities lending programme at the Norwegian Government Pension Fund was suspended in late 2007 (NBIM (2009, p 19)) and lending against cash peaked in the first quarter of 2008 (Box A, Table A-1). The Central Bank of Colombia exited its securities lending programme in March of 2008 (Banco de la República (2009, p 122)). A central bank could more easily exit from its securities lending programme at this stage than after the Lehman failure.

Box B

**Developments at the BIS**

The BIS deposit base had been increasing steadily over the two years ending March 2007 and March 2008 by some 15%, in line with the general increase in worldwide foreign exchange reserves. In the year to March 2009, confronted with a significant deterioration of financial markets, the BIS took actions to improve its balance sheet resilience, thereby fulfilling its fiduciary responsibilities towards its central bank shareholders and customers. Like most central bank reserve managers, but to a lesser extent owing to its credit intermediation function, the BIS reduced uncollateralised exposures to commercial banks and increased its collateralised exposures to them as well as its investments in sovereign and quasi-sovereign assets. The BIS also reduced the size of its liabilities by some 20% in the year to March 2009 through price actions and after the Lehman failure by quantitative measures as central banks focused primarily on the safety of their reserve investments ("flight to quality"). This cautious policy, coupled with a significant reduction of the main market risk drivers on its balance sheet (in particular a reduction in the duration of its investment portfolio) protected BIS credit quality and profitability to the benefit of the central bank community. Since then the BIS has continued to link the evolution of its investments and its liabilities to its capital adequacy with the prime objective of maintaining a very high credit quality.

## 3.2 Developments in the long-term portfolio

In the longer-term portfolio, the first salient development was the shift within agency holdings from debentures to mortgage-backed securities. In the year to mid-2008, official reserve managers did not reduce their holdings of debentures. But agency mortgage-backed securities received practically all the incremental investment. Recall that questions about the

financial strength of the agencies built over the year to mid-2008. In July testimony before the Senate Banking Committee, US Treasury Secretary Paulson asked the Congress for a "bazooka", ie such heavy-duty authority to take over Fannie Mae and Freddie Mac that it would be unlikely to be needed. Official investors loaded up on two-name paper, ie mortgage-backed securities, suggesting an uncertain assessment of the agencies as going concerns.

The second noteworthy development in the long-term portfolio was continued flows into straight corporate bonds and even equities. This seems to be small in Table 1 until it is remembered that corporate bond spreads had widened and equity markets had sold off, imposing capital losses on holders. Among corporate bonds there was the opposite shift from that in holdings of agencies, that is, from asset-backed paper to straight bond holdings.[9] Foreign official holdings of US equities rose even in the face of price declines after the October 2007 peak in equity prices. China may have contributed to this growth,[10] but the Norwegian Government Pension Fund also adhered to the discipline of its target allocation and "rebalanced" by selling bonds and buying (worse performing) equities. (Many other official wealth managers suspended rebalancing in the face of losses.)

In conclusion, this period featured, rather than a flight, a walk to quality by reserve managers. Bank deposits looked less sure; Treasury and agency bills looked better. Some reserve managers reacted to previously unrecognised risks in securities lending, which may have been approved as a low-risk incremental return generator. In the long-term securities holdings, diversification by official reserve managers into agency mortgage-backed securities, straight corporate bonds and equities continued through mid-2008.

## 4. After the Lehman failure

Lehman's failure shocked official reserve management in manifold ways. It should be recalled that it followed, by a long week, the conservatorship of the major US agencies. This event may have relieved official investors in those agencies, but to the public it put a cloud over an entire asset class into which official reserve managers had diversified over the previous 10 years.

Again, our discussion first takes up liquidity management, starting with the flight to quality in the investment of liquidity portfolios and then the "de-risking" of securities lending programmes. Then, we turn to developments in the investment portfolio. Noteworthy developments here include the dumping of agency debentures (straight and callable) but no evidence of disinvestment from corporate bonds or equities.

### 4.1 Developments in the short-term portfolio

After Lehman's default, official reserve managers flew to sovereign quality in an unprecedented fashion. Nothing like late 2008 can be seen in the wake of Herstatt in 1974,

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[9] Among corporate bonds, official monetary institutions are reported to have modestly reduced their private label asset-backed securities (from $44 billion in June 2007 to $40 billion in June 2008, including valuation losses). Reported holdings of other corporate bonds continued to increase in this stressed period, however, from $55 billion to $65 billion. The entry on Table 1 for corporate bonds represents the sum of asset-backed and other. See Table 3 below for loss estimates for corporate bonds and equities, and Table 7 for the breakdown of corporate bonds.

[10] Setser and Pandey (2009). The Treasury/Federal Reserve survey data suggest that measured "equity" holdings are only to a minor extent shares in mutual funds or hedge funds.

Mexico in 1982, Continental Illinois in 1984, the stock market crash of 1987, Drexel in 1990, LTCM and Russia in 1998 or WorldCom in 2001.

The official walk to quality picked up its pace and official holdings of Treasury bills rose over the summer of 2008. Then, official holdings of US Treasury bills more than doubled from the end of August 2008 to the end of the year to over $500 billion.[11]

In retrospect, it was fortuitous that the supply of Treasury bills jumped in late 2008. The US Treasury accommodated the Federal Reserve's decision to sterilise dollars swapped with European central banks. The Treasury "overfunded" its cash flow needs by selling extra Treasury bills and depositing the proceeds in the Federal Reserve Bank of New York. As a result, central banks, as well as money market funds, found more bills in the market into which to flee than otherwise would have been available.

Reserve managers bought Treasury bills as they allowed riskier placements – agency paper and bank deposits – to mature without rolling them over. Whereas in the year to mid-2008 official reserve managers had found safety in agency bills, in the year to mid-2009 they let three quarters of their holdings mature without rolling them over.

With regard to bank deposits, the failure of Lehman led a large US dollar money market fund holding Lehman paper to announce that it could not redeem shares at $1.00 (ie, it had "broken the buck"). This led to a run on these funds (Baba et al (2009)), including by Asian central banks that reportedly withdrew funds from US dollar money market funds domiciled outside the United States in Dublin or Luxembourg. This run left European and other non-US banks scrambling for dollars and left other depositors in these banks hesitant to roll over maturating deposits.

Thus, it may be presumed that, among such depositors, official reserve managers reduced their bank deposits in the immediate aftermath of the Lehman Brothers bankruptcy. This is consistent with the aggregate of available disclosures by the authorities in Graph 4. But the BIS data on bank liabilities to officials rose in the fourth quarter of 2008 as the positive result of central bank liquidity provision overwhelmed withdrawals by reserve managers.[12] As a result, it is difficult to pin down the scale of the rundown of official deposits in banks in this crucial period. It does seem safe to say that the withdrawal of dollars by officials was not as acute as the withdrawal by the largest source of dollars for non-US banks, namely US dollar money market funds.

Stepping back to take a longer view, the facts are clearer (Table 1). While official holdings of Treasury bills rose by $350 billion in the year to June 2009, offshore dollar deposits and agency bills ran off in the amounts of about $200 billion and $100 billion, respectively.

Given that official deposits had long favoured non-US banks for their dollar deposits,[13] it is not surprising that deposits in mostly non-US banks placed outside the United States suffered the greatest decline (Table 2). These fell by more than half between mid-2007 and mid-2010, and most sharply in 2008-09. Even though the Federal Reserve swapped dollars freely with partner central banks to permit them to provide dollar funding to non-US banks, the market share gain of US banks in official deposits may reflect the perception that US banks are closer to the source of dollar liquidity.

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[11] Official depositors initially responded positively to the Irish blanket guarantee of deposits, stepping up their euro placements (Graph 2), only to reconsider as the underwriting of the relatively large bank liabilities visibly strained state finances.

[12] See discussion in Gadanecz et al (2009, p 20).

[13] See McCauley (2005), He and McCauley (2010).

Table 2

**Official dollar deposits by location and nationality of banks**

Amounts outstanding, in billions of US dollars

| Nationality of banks | June 2007 Location of reporting banks | | | June 2008 Location of reporting banks | | | June 2009 Location of reporting banks | | | June 2010 Location of reporting banks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | US | Off-shore[1] | Total | US | Off-shore[1] | Total | US | Off-shore[1] | Total | US | Off-shore[1] | Total |
| US | 128.9 | 21.4 | 150.3 | 116.0 | 27.5 | 143.5 | 117.7 | 24.5 | 142.2 | 107.8 | 24.8 | 132.6 |
| Others | 96.9 | 462.1 | 558.9 | 75.5 | 404.7 | 480.1 | 47.1 | 258.8 | 306.0 | 37.0 | 209.9 | 246.9 |
| Total | 225.8 | 483.5 | 709.2 | 191.5 | 432.2 | 623.7 | 164.8 | 283.3 | 448.1 | 144.8 | 234.7 | 379.5 |

[1] Banks located in reporting countries other than the US.

Source: BIS locational by nationality statistics.

Elsewhere in cash management, Lehman's failure highlighted vulnerabilities at various points in the securities lending process. At the front-end repurchase transactions, in which securities are exchanged for cash, concerns heightened regarding counterparty credit and expectations of "fails", ie securities not being returned on time. In many securities lending contracts, however, the custodian had undertaken to indemnify the owner of the securities in the event that the security was not returned. However, the perception of risk also rose at the back end, where the cash collateral received in exchange for the security was invested. The news that a large US money market fund had "broken the buck" and the distress of AIG, which had actively invested cash raised against its insurance subsidiaries' securities, led to questions about the value and liquidity of other, less regulated pools of US dollar liquidity. These were known not only to have invested in regulated money market funds but also to have, in some cases, riskier investment profiles in terms of credit and maturity.

Under these circumstances, official reserve managers faced the following alternatives. They could exit from the securities programme. Alternatively, they could remain in the programme, possibly reducing its size, but invest any cash received as collateral only in reverse repos. Alternatively, they could stay in the programme, and tighten the range of permitted investments. Or they could continue with previous practice.

It is not possible to say with any precision how official reserve managers reacted. One well placed market participant suggested exits from securities lending programmes by half of his official clients. Out of 19 responses in late 2008 to a trade press survey, five reported exiting their securities lending programmes and another four to shifting the investment of cash collateral to reverse repo ("Survey answers" (2009)).[14]

Market participants report that some official reserve managers felt that they had a duty to maintain market liquidity by continuing to lend. Reportedly, this sense of duty was encouraged by the Federal Reserve Bank of New York and, in Europe, by the ECB.[15]

[14] Whether the exit rate by official reserve managers was closer to a quarter or a half, their propensity to exit was apparently higher than that of institutional investors in general. In a State Street fourth quarter 2008 earnings call, an executive put the rate of exit at 10% (45 clients; State Street (2009)). See also Carver and Pringle (2009).

[15] That said, the securities lending programme of the Federal Reserve (Fleming et al (2009)) can be seen in some respects as a substitute for securities lending by other institutional investors, including central banks.

Exits from securities lending would normally mean that the cash had to be returned, and this in turn would normally mean that the money market investments in which the cash had been placed had to be liquidated. The Colombian central bank (Banco de la República (2009, p 126)) reported a loss in March 2009 from its sale of an interest in a structured investment vehicle (Sigma Finance) in which funds raised from securities lending had been invested.

Some central banks found themselves stuck in investments of cash raised by securities lending. The Bank of New York, Northern Trust and State Street were reported in October 2008 to be restricting withdrawals from their riskier cash investment pools (in a process known as "gating"). Central banks were persuaded to leave their funds in cash investment pools on the premise that these would return to par value. In some cases, permitted redemptions were reported to have been transacted at a $1.00 net asset value, despite lower market values; in other cases, in kind redemptions were reported.[16] The upshot was that many central banks had to attend to thorny issues arising from transactions that had been entered into on the presumption of low risk and certain liquidity.

Central banks' securities lending bottomed out in 2009 at less than half of amounts reached before the Lehman failure, and have since recovered half of the decline. The risks arising from securities lending programmes are reportedly better understood and managed than before the crisis (see Box A).

### 4.2 Developments in the long-term portfolio

In the long-term portfolio, official reserve managers sold agency debentures and bought US Treasury notes. More than one governor at the meeting in Basel in September 2008 publicly welcomed the US government's taking the two agencies into conservatorship. Nevertheless, official reserve managers sold $200 billion (almost 40%) of agency debentures in the year to June 2009, and another $50 billion in the year to June 2010. Meanwhile, they added over $400 billion in US Treasury notes to their portfolio in each of the years to June 2009 and June 2010 (only in small part owing to valuation gains).

The Central Bank of the Russian Federation stood out among those officials selling agency paper. At the end of 2007 it held 37% of its R6.6 trillion portfolio of foreign securities in securities of Fannie Mae, Freddie Mac and the Federal Home Loan Banks, that is, a total of $100.8 billion. With the deterioration of the US agencies and considerable public discussion in Russia of the attendant risks, the central bank had reportedly sold 40% of its holdings by the time of the conservatorship of Fannie and Freddie in early September 2008 (Fabrichnaya and Bryanski (2008)). By the end of 2008, the holding had been slashed to 0.89% of the securities portfolio, and by the end of January to zero (Central Bank of the Russian Federation (2009, pp 75, 140)). Ironically, a successful bet on US taxpayer support for the agencies could not stand up against the Russian popular response. Official statements that the holdings of agency paper had produced good returns (see next section) did not avail and the officials liquidated the position.

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[16] See State Street 8-K 18 May 2009. Had these pools been subject to SEC rules, the $1.00 net asset value would have been abandoned (the "buck" broken). On 7 July 2010, State Street announced a $330 million charge in order to inject funds to return some of the security lending investment pools to a net asset value of $1.00 so that the gating could be lifted. Other pools received different treatment: "In December 2010, in order to increase participants' control over the degree of their participation in the lending program, we divided certain direct lending collateral pools into liquidity pools, from which clients can obtain cash redemptions, and duration pools, which are restricted and operate as liquidating accounts. Depending upon the direct lending collateral pool, the percentage of the collateral pool's assets that were represented by interests in the liquidity pool varied as of such division date from 58% to 84%" (State Street 8-K, 2 February 2011). See Annex Table A2 for information on the range of shortfall from the $1.00 net asset value of certain non-SEC registered cash collateral pools.

Again, there was no evidence of official reserve managers' turning away from other alternatives to US Treasury securities. Foreign official holdings of corporate bonds and equities held up, and their holdings of agency mortgage-backed securities even rose over the year to June 2009.

## 5. Returns on US securities

We have seen how reserve managers responded to the crisis. As a prelude to the next section's questions for the future, a review of the recent returns of official reserve managers on their US securities portfolios is useful. The conclusion is that US Treasury notes played their role well as a rainy day portfolio. While official holdings of corporate bonds and especially of equities produced losses from mid-2007 to mid-2009, their Treasury and agency holdings produced gains (Table 3).

Table 3

**Capital gains/losses on official holdings of US securities**

In billions of dollars

| Year ending: | Treasury | Agency | Corporate bonds | Equities |
|---|---|---|---|---|
| June 2002 | 52 | | | |
| June 2003 | 36 (6.4%) | | | |
| June 2004 | –43 (–6.6%) | | | |
| June 2005 | 24 (2.6%) | | | |
| June 2006 | –67 (–6.2%) | | | |
| June 2007 | 6 (0.5%) | 2 (0.4%) | –1 (0.6%) | 41 (18.8%) |
| June 2008 | 76 (5.2%) | 20 (2.7%) | –4 (–3.6%) | –38 (–14.2%) |
| June 2009 | 40 (2.4%) | 41 (4.2%) | –3 (–2.8%) | –103 (–28.3%) |
| June 2010 | 73 (3.6%) | 23 (3.1%) | 3 (2.7%) | 37 (11.8%) |

Valuation adjustment reported for official holdings of US Treasuries, but only for all holdings of agencies, corporate bonds and equities. Percentage adjustments for all holdings are applied to holdings of officials of agencies, corporate bonds and equities.

Sources: US Treasury et al (2008–11), authors' estimates.

These gains and losses, however, do not capture the reputational challenge that some official reserve managers faced in holding agency securities as the agencies racked up losses (borne by common and preferred shareholders), eventually entered an obscure process of conservatorship and required equity transfusions from the US Treasury. It is not easy to explain why the press harped on the exposure of foreign exchange reserves to agency securities in some countries and reported little on it in others.

## 6. Questions for the future

The question is whether the global financial crisis will be seen in retrospect as a watershed in reserve management, breaking trends, or whether it will look more like a pause. Pihlman and van der Hoorn (2010) argue that the lessons learned should result in a concentration of portfolios in the most creditworthy government bonds rather than in credit portfolios. Others wonder whether the concept of the credit risk-free government bond has survived the fiscal consequences of the crisis. Certainly, research into sovereign risk, for instance Hohensee and Prasad (2010) and Brennan et al (2010), does not take it as given that the best-rated sovereigns pose no credit risk. We take up five questions.

### 6.1 More emphasis on worst-case liquidity and bigger liquidity tranches?

We have seen that, while there was a flight to quality in the official short-term portfolio, official reserve managers did not in aggregate actually increase the proportion of short-term assets since mid-2007. To the contrary, the proportion of short-term holdings fell from 30% in mid-2007 to only 19% in mid-2010 (Table 4).

Table 4

**Foreign official holdings of US dollars by instrument and maturity**[1]

In billions of US dollars

| | June 2007 | | June 2008 | | June 2009 | | June 2010 | |
|---|---|---|---|---|---|---|---|---|
| | **Short-term** | **Long-term** | **Short-term** | **Long-term** | **Short-term** | **Long-term** | **Short-term** | **Long-term** |
| **Treasuries** | 159 | 1,452 | 226 | 1,684 | 575 | 2,117 | 454 | 2,592 |
| **Agencies** | 80 | 750 | 130 | 967 | 34 | 794 | 27 | 714 |
| **Other** | 861 | 365 | 741 | 468 | 539 | 418 | 430 | 509 |
| **Total by maturity** | 1,100 | 2,567 | 1,097 | 3,119 | 1,148 | 3,329 | 911 | 3,815 |
| ***Memo: maturity shares*** | *30%* | *70%* | *28%* | *72%* | *26%* | *74%* | *19%* | *81%* |
| ***Total official holdings*** | *3,667* | | *4,216* | | *4,477* | | *4,726* | |

[1] By original maturity.

Source: Table 1.

During the crisis period, a shortening of the portfolio to some extent reflected the drawing down of reserves, less in Europe or Japan than in emerging market economies like Brazil, India, Indonesia, Korea, Malaysia, the Philippines, Russia and Singapore. In many cases, the first reserves to be mobilised were the forward purchases of dollars, but then presumably the short-term portfolio was drawn upon. Foreign exchange reserves had in many cases returned to pre-crisis levels by mid-2010 (and in some cases well exceeded those levels), so the effect of the draw-down of reserves on the maturity composition should have passed.

One factor that may limit the shortening of the official dollar holdings in aggregate is the increasing concentration of holdings. Even if many reserve managers take the lesson that they need to hold bigger liquidity tranches, the largest reserve holders may not take this lesson and the aggregates may not show much portfolio shortening. Global reserves are increasingly concentrated (Table 5).

Indeed, the portfolios of the largest reserve holders seem to be invested only to a very limited extent in short-term instruments. Taking US Treasury securities held by China, including both the official sector per se and banks and institutional investors, holdings of US Treasury coupon securities were reported at $1.1 trillion in mid-2010, whereas holdings of bills amounted to only $4 billion. Less extreme was the position of the public and private sectors in Japan, with $737 billion of coupons and $63 billion of bills. However, since the Japanese foreign exchange reserves had only grown from March 2004 through mid-2010 with investment returns, it is the growing Chinese reserves and their evidently medium-term investment that account for the aggregate trend toward longer-term instruments in identified official holdings of US dollars. Indeed, it is striking that reserve managers as a whole are underweight US Treasury bills when measured against the outstanding portfolio (Graph 5).

Table 5

**Concentration in the holdings of global foreign exchange reserves**

In per cent

| | Largest holder | Top 3 holders | Top 5 holders | Top 10 holders |
|---|---|---|---|---|
| 1980 | 12.0 | 24.6 | 36.0 | 52.8 |
| 1985 | 10.2 | 22.5 | 32.9 | 50.0 |
| 1990 | 8.3 | 23.5 | 36.1 | 53.6 |
| 1995 | 12.4 | 24.5 | 34.7 | 50.2 |
| 2000 | 17.9 | 32.0 | 42.5 | 54.7 |
| 2005 | 19.2 | 44.0 | 52.9 | 66.7 |
| 2010 latest | 29.7 | 46.6 | 55.7 | 70.3 |

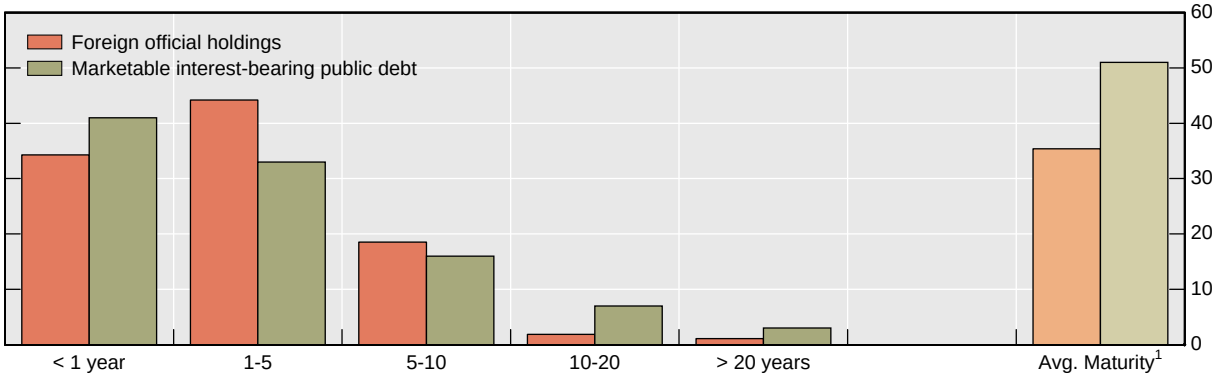
Sources: IMF; Central Bank of China.

Overall, it is not obvious that liquidity tranches have been increased. That said, there may be persistent changes to securities lending, including moving it in-house or lending out the cash more cautiously.

Graph 5

**Maturity of foreign official holdings of Treasury securities and total outstanding, June 2009**

In per cent




[1] Number of months.

Sources: Department of the Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System, *Survey of foreign portfolio holdings as of June 30, 2009*, April, 2010; US Treasury.

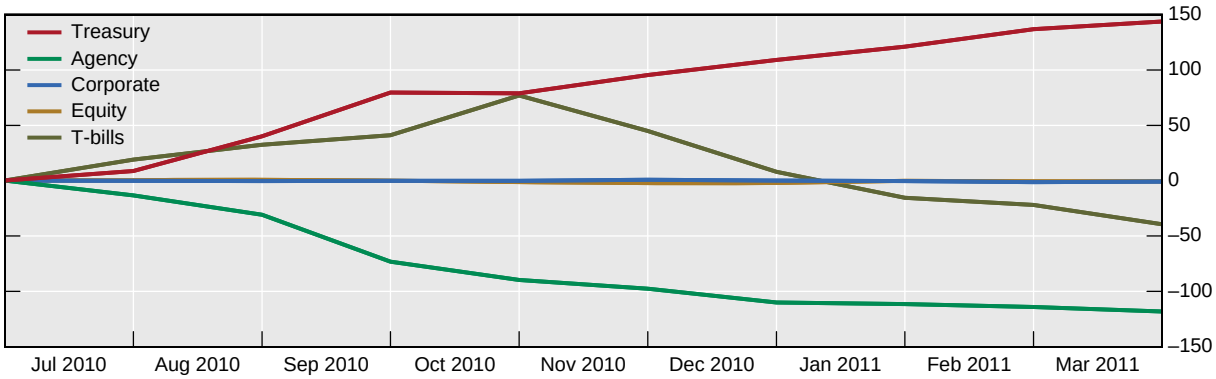
## 6.2 Will official investors restore the previous weight on bank deposits?

Going into the crisis, bank deposits bulked large in identified dollar holdings at over 20%, making up most of the short-term portfolio. These have now fallen to below 10% in substantially larger overall reserve holdings. These observations raise the question of whether official investors will return to holding more bank deposits.

Graph 6

**Cumulative purchase of US securities by foreign officials**

Since end-June 2010, in billions of US dollars



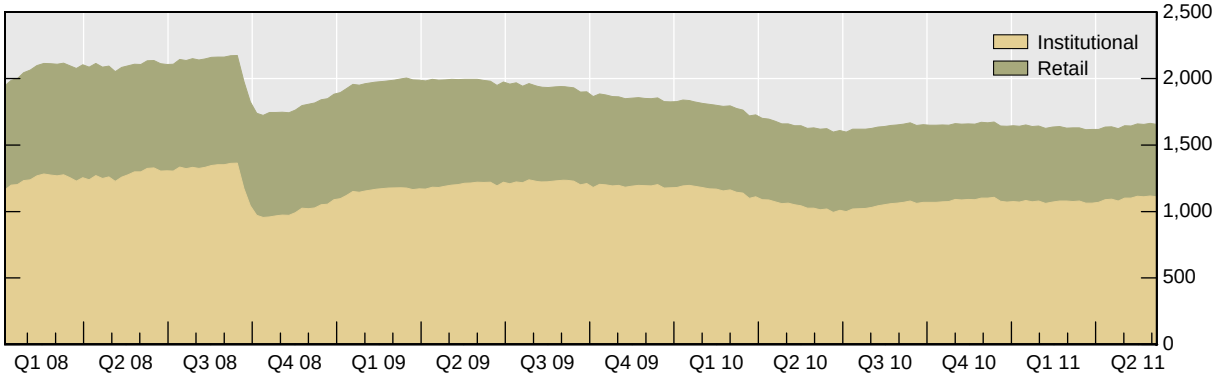

Source: Treasury International Capital.

Recent developments in the short-term portfolio do give a clear positive answer. While official reserve managers have held their deposits with central banks fairly steady (Graphs 1 and 4), they reduced their holdings of Treasury bills by over $100 billion in the year to June 2010 (Table 1) and on balance have not increased holdings since then (Graph 6). However, bank deposits have not benefited much from the reduced allocation to Treasury bills. Returning to Graph 1, the available 2010 data show hesitant signs of a recovery of official deposits with banks. Officials increased their euro deposits in banks in the first quarter of 2010 only to draw them down in the third quarter. After reducing US dollar deposits in the first two quarters of 2010, official investors increased their dollar deposits in the third quarter.

Graph 7

**Total net assets of non-government money market mutual funds**

In billions of US dollars



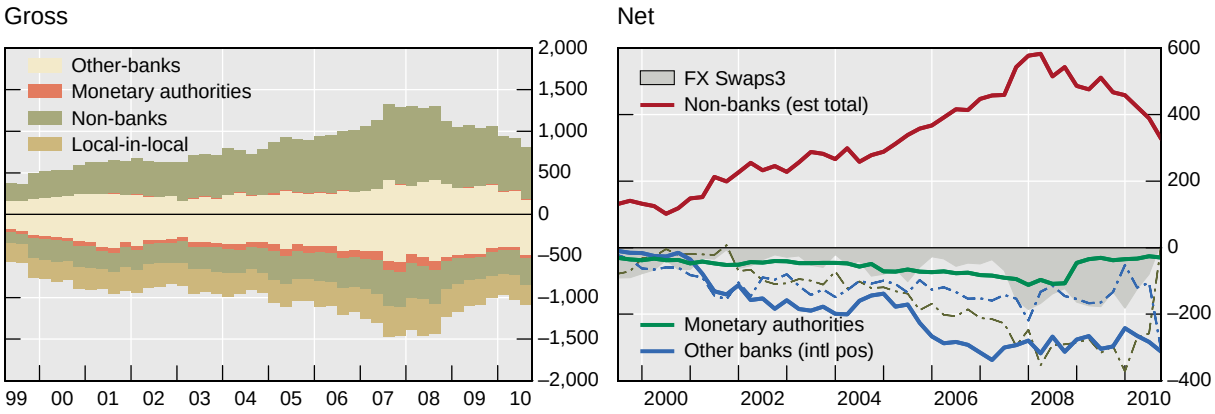

Source: Investment Company Institute.

Before the crisis, central banks were probably the second largest source of dollar funding for non-US banks, coming behind US dollar money market funds. US dollar money market funds have struggled in the low interest rate environment, with sponsors often waiving management fees to keep returns a whisker above 0%. Into 2010, the shrinkage of US money market funds, which place about half of their funds in non-US banks, put a squeeze on these banks' dollar funding (Graph 7).

Graph 8

**German big banks' USD positions by sector**

In billions of US dollars; dates indicate positions at end-Q1 of each year




Sources: BIS consolidated banking statistics (IB basis); BIS locational banking statistics by nationality; BIS calculations.

Lower official deposits and placements from money market funds have clashed with the still large needs of non-US banks for dollar funding. For instance, German banks still need, according to admittedly approximate estimates by our colleagues at the BIS,[17] more than $300 billion to fund dollar claims on non-banks (Graph 8). While they have reduced these dollar funding needs since the onset of the crisis, they still need to bid for sizeable amounts.

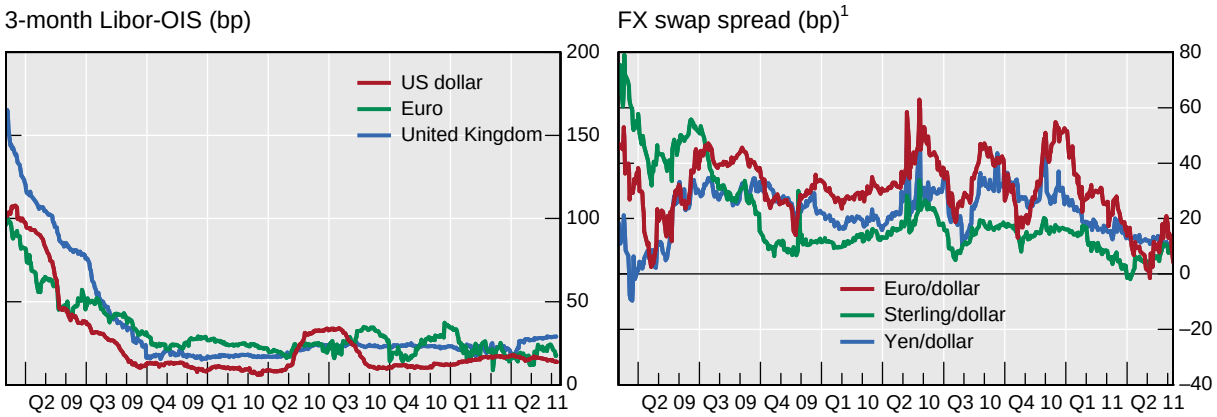
The result of the squeezed supply of dollar funding to foreign banks by central banks and money market funds and their ongoing demand for dollar funding is a persistent skew in the foreign exchange swap market (Graph 9). While Libor rates have to varying extents become more normal in relation to central bank policy rates (as captured by overnight interest rate swap yields in the left-hand panel), the skew in the swap markets has persisted at levels that were unimaginable before the crisis, especially in euro/dollar swaps (right-hand panel).

In conclusion, if official deposits with banks have bottomed out, it remains difficult to envisage a return to the former weight on banks. Among four large holders of bank deposits, only the Eurosystem central banks are showing a clear recovery of placements with banks (Graph 10). Many central banks are still put off by the financial risk and the lack of liquidity of bank deposits. The banks that emerged from the crisis in good shape do not bid for funds at very attractive rates at present because they are cash rich and unwilling to expand their balance sheets with interbank lending.

[17] See McGuire and von Peter (2009).

Graph 9

**Domestic money market and foreign exchange swap spreads, 2009–10**



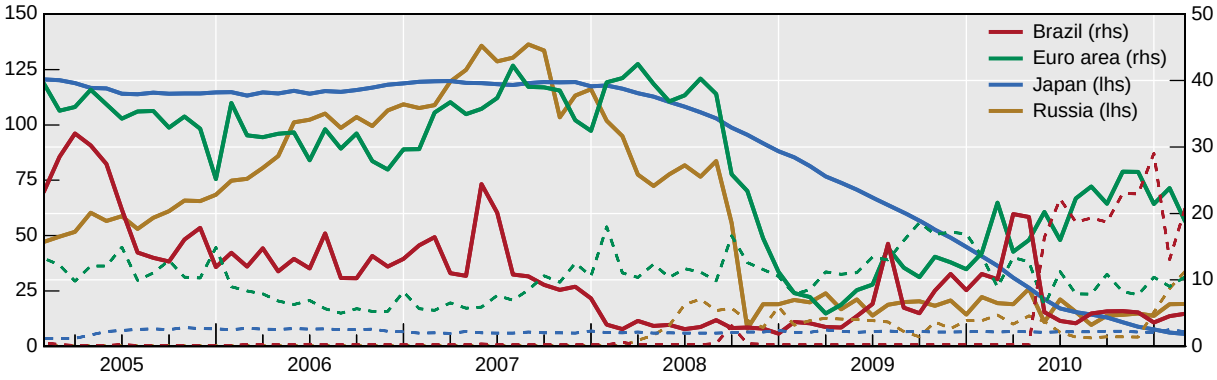

[1] Spread between three-month FX swap-implied dollar rate and the three-month USD Libor; the FX swap-implied rate is the implied cost of raising US dollars via FX swap using the funding currency.

Sources: Bloomberg; Datastream; Markit; national data.

Graph 10

**Central bank deposits**

In billions of US dollars




The solid lines refer to deposits in banks (domestic and foreign) and the dotted lines indicate deposits with other national central banks, the BIS and the IMF.

Source: IMF SDDS.

## 6.3 Do US agencies have a future as an asset class for official investors?

At writing, the US housing agencies' future as an asset class for reserve managers remains in doubt. We have seen how official holdings of agency obligations fell from $1.1 trillion in mid-2007 to $741 billion in mid-2010.[18] Monthly Treasury International Capital data suggest

[18] Thus, from the perspective of official portfolio managers, the Federal Reserve purchases were very timely. As the Fed bid for almost $200 billion in agency debentures and $1.25 trillion in mortgage-backed securities from late 2008 to March 2010, official portfolio managers sold.

another $100-plus billion in sales of long-term agency bonds (including prepayments on mortgage-backed securities) between June 2010 and March 2011 (Graph 6).

As we have seen, official reserve managers as a group shifted from the single-name debentures and bills of the agencies to their mortgage-backed securities. While official reserve managers originally sought to avoid the complexity of mortgage-backed securities in favour of the more predictable agency bullets and callables, they preferred the two-name mortgage-backed paper when the agencies got into trouble. Nevertheless, June 2010 holdings shows a decline even of the agency mortgage-backed securities holdings. On this showing, agency MBS just might remain a viable asset class for reserve managers, while the direct obligations of the agencies look to be in a run-off mode.

Table 6

**Official holdings of US agency debt**

| | **Long-term** | **MBS** | **Deben-tures** | **Bills** | **Total** | ***Memo: Fed + Treasury holdings*** |
|---|---|---|---|---|---|---|
| March 2000 | 88 | | | | | *0* |
| June 2002 | 134 | | | | | *0* |
| June 2003 | 180 | | | | | *0* |
| June 2004 | 211 | 23 | 194 | | | *0* |
| June 2005 | 324 | 63 | 261 | 112 | 436 | *0* |
| June 2006 | 473 | 118 | 355 | 110 | 583 | *0* |
| June 2007 | 751 | 236 | 515 | 80 | 830 | *0* |
| June 2008 | 967 | 435 | 532 | 130 | 1096 | *0* |
| June 2009 | 795 | 475 | 320 | 34 | 828 | *724* |
| June 2010 | 714 | 443 | 271 | 27 | 741 | *1508** |

Sources: US Treasury et al (2008–10); US Treasury (2011); Federal Reserve H.4.1 Release for 1 July 2010 and *Flow of Funds*.

### 6.4 Do corporate bonds have a future with official reserve managers?

Overall, official holdings of US corporate securities held up, albeit at fairly low dollar level, during the crisis (Table 7). To be sure, the turmoil in the commercial paper market after the Lehman Brothers failure led official reserve managers to back out of this money market in 2009. But selected official reserve managers have stayed with long-term corporate bonds.

The composition of official holdings of US corporate bonds, however, has shifted in the opposite direction from official holdings of agency bonds. As of June 2007, official reserve managers had bought almost equal amounts of corporate asset-backed securities and plain-vanilla corporate bonds. The experience of the crisis left them willing to continue to add to their holdings of straight corporate bonds – the increase in the year to mid-2009 came despite a significant spread widening that led to valuation losses (see above). The June 2010 holdings point to a small rise in straight corporate bonds – despite downgrades of AAA-rated issuers. On the asset-backed side, however, holdings of private-label mortgage-backed securities have fallen – through mid-2009 partly owing to valuation losses – resulting in a sharp overall decline in holdings.

On the available evidence, therefore, it appears that straight US corporate bonds remain in the sights of at least some official reserve managers. The future of private-label asset-backed securities is less clear, particularly that of private mortgage-backed securities.

Table 7

**Official holdings of US corporate bonds and paper**

| | Asset-backed securities* | *Of which mortgage-backed* | Other corporate bonds | Commercial paper | Total |
|---|---|---|---|---|---|
| March 2000 | | | | na | 12** |
| June 2002 | | | | na | 18** |
| June 2003 | | | | na | 21** |
| June 2004 | 18 | | 29 | na | 47** |
| June 2005 | 17 | | 44 | 7 | 68 |
| June 2006 | 30 | | 67 | 12 | 108 |
| June 2007 | 44 | *26* | 55 | 17 | 116 |
| June 2008 | 40 | *18* | 65 | 18 | 124 |
| June 2009 | 35 | *9* | 72 | 9 | 116 |
| June 2010 | 21 | *7* | 77 | 6 | 104 |

* Corporate ABS are backed by a wide variety of assets, such as car loans, credit card receivables, home and commercial mortgages, and student loans. ** Does not include commercial paper.

Sources: US Treasury et al (2008–11).

### 6.5 Is the diversification of official reserve portfolios continuing?

Our reading of the data and conversations with reserve managers suggest that a lively interest remains in diversification, particularly among large reserve holders. The attitude is probably best characterised as an amber light turning to green. Mistakes were made and lessons are being drawn. However, there are two forces putting diversification back on the agenda.

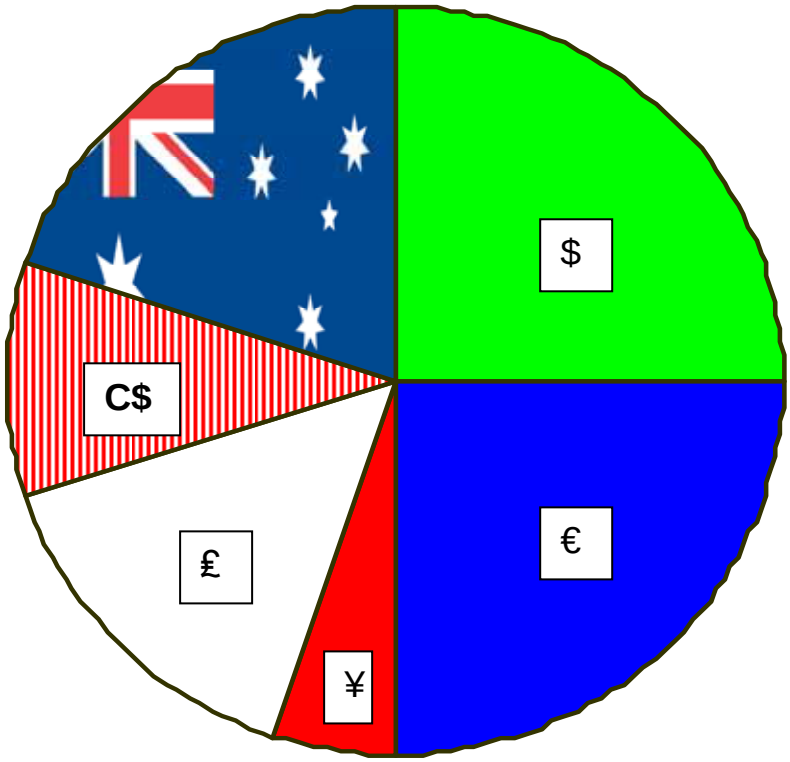
First, the monetary policy response to the financial crisis itself has lowered interest rates in the main reserve currencies to very low levels. True, many central banks finance (or "sterilise") reserve holdings with domestic currency instruments of systematically shorter duration than those instruments held in the reserve portfolio. Despite this yield curve boost, the relationship between funding costs and interest receipts is for many reserve portfolios very difficult. Even in places where interest rates are so low that the carry remains positive, there can be pressure to contribute more to the fiscal resources. On top of this "carry" problem is the experience of, or prospect of, valuation losses owing to the appreciation of the domestic currency against the major reserve currencies. Together, these make for a very challenging environment for official reserve managers.

In addition to the diversification of instruments that we have reviewed above, there is evidently interest in diversification by currency. An extreme example is New Zealand, but there is interest in commodity currencies by other commodity producing countries, and industrial countries alike. After a review of its currency allocation (Eckhold (2010)), the Reserve Bank of New Zealand has chosen to invest its reserves to a substantial extent in the

commodity currencies of Australia and Canada (Graph 11). In addition, there are reports of central banks' buying Korean Treasury bonds.

Graph 11

**Currency allocation of New Zealand's foreign exchange reserves**




But it is important to recognise the limits of this kind of diversification. Sovereign debt outstanding of Australia, Canada, Korea and New Zealand amounts to only about $2 trillion. And in the emerging markets of Brazil, Colombia, Indonesia, Hungary, Malaysia, Mexico, the Philippines, Peru, Poland, Russia, South Africa, Thailand and Turkey, there is only $3 trillion in outstanding sovereign debt. Both of these are an order of magnitude smaller than the $38 trillion in the sovereign markets of the United States, the euro area, Japan, the United Kingdom and Switzerland.

In conclusion, US Treasury securities will for a time not only represent the plurality of US dollar reserves but also command a higher fraction of dollar holdings than before the global financial crisis. Reserve managers will continue to explore other investments, but with a more critical and cautious attitude than before the crisis. The limited size and liquidity of many alternatives to US Treasuries will pose ongoing challenges.

## 7. Conclusions

We have seen that the global financial crisis led official reserve managers to pare back their exposure to banks and to put their holdings of US agency debentures into a run-off mode. Harder to measure, but just as surely, official reserve managers have cut back sharply on the

lending of their securities and especially the credit trade of raising cash against high-quality securities and investing the proceeds in lower-quality securities.

Going forward, central banks may increase their bank placements gradually and extend maturities. While the Basel III liquidity rules put pressure on banks to extend maturities, central bank placements remain by all accounts relatively short. In any case, banks need to deleverage and non-US banks need to work down their dollar funding requirements. Bank funding markets cannot be described as normal as long as the skew in the foreign exchange market persists.

From the standpoint of official reserve managers, there is good news and bad news on the sovereign debt front. Recession, fiscal stimulus and bank rescues have left lots of government paper for reserve managers to buy, although prospective returns may not be so attractive.

The bad news for official reserve managers is that the rise in debt resulting from recession, fiscal stimulus and bank rescues has undermined the notion of the risk-free placement. Can central banks assign a zero probability of default to any sovereign?

Thus, the job of the official reserve manager is very challenging. Investment yields are low, credit risks lurk and there is renewed pressure for returns.

# Annex

Table A-1

**Securities lending by Norwegian Government Pension Fund**

In billions of Norwegian kroner

| Securities lent | | | | of which against cash | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Total** | **Equity** | **Bonds** | **Total** | **Reverse repo** | **Fixed income** | | | | ***Memo: Gain/losses recognised*** |
| | | | | | | **Total** | **ABS** | **SIVs** | **Others** | |
| 2007:Q4 | 516 | 181 | 334 | 298 | 201 | 93 | 46 | 11 | 37 | *–3 (year)* |
| 2008:Q1 | 541 | | | 327 | | | | 8 | | *–1.5 (quarter)* |
| 2008:Q2 | 515 | | | 249 | | | | 5 | | *–.4 (quarter)* |
| 2008:Q3 | 435 | | | 202 | | | | | | *–.1 (quarter)* |
| 2008:Q4 | 374 | 183 | 191 | 186 | 114 | 63 | 39 | 2 | 22 | *–6 (year)* |
| 2009:Q1 | 335 | | | 160 | | | | | | *+1 (quarter)* |

Source: Norges Bank Investment Management reports.

Table A-2

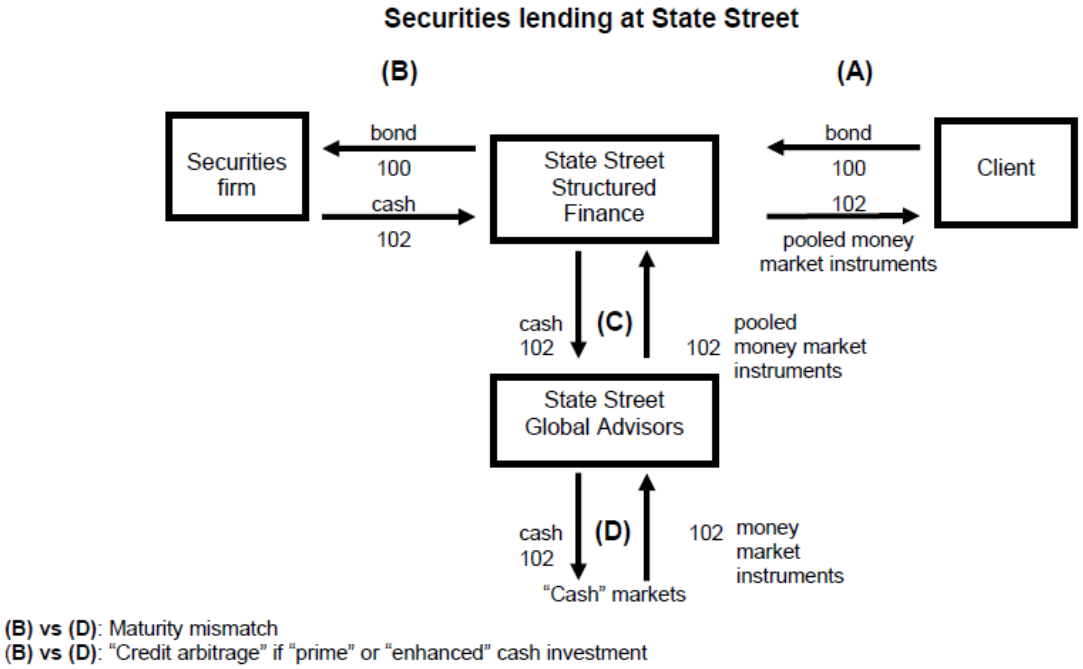
**State Street's securities lending and unregistered cash collateral pools**

| Date | Outstanding securities lending (USD billions) | Unregistered cash collateral pools (USD billions) | Net asset value range | Net asset value average |
|---|---|---|---|---|
| 31 December 2007 | | 194* (150) | .99-1.00 | .993 |
| 30 September 2008 | | 167 | | |
| 31 December 2008 | 347 | 122* (85) | .908 (.92)-1.00 | .939 (.941) |
| 30 March 2009 | | 122* | .904-1.00 | .947 |
| 31 December 2009 | | 85 | .93-1.00 | .986 |
| 30 June 2010 | | | | .989 |
| 31 December 2010 | | 49 | .91-1.00 | .993 |

*. Figures in parentheses for end-years are from the 2 February 2011 8-K.

Source: State Street 8-Ks.

Graph A



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