QE and bank balance sheets: the American experience

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At the start of the year, the European Central Bank launched a quantitative easing programme, consisting of purchases of government bonds in the secondary market. Such an approach is intended to counter deflationary pressures, as it tends to increase directly the money supply (mainly resident customers' deposits) and thus to offset the lack of bank lending, the usual conduit of monetary creation. Since only credit institutions hold accounts with the central bank, any purchase of assets by the central bank transits through the balance sheet of a bank and therefore automatically swells the monetary base (banknotes, coins, credit institutions' reserves with the central bank). When the central bank buys securities from an insurance company, a pension fund, or any other non-bank agent, the commercial bank, which plays the role of intermediary, credits the account of its client (money supply) and sees its reserves with the central bank credited by the same mount (monetary base). A quantitative easing programme will therefore have a significant impact on bank balance sheets.

The US quantitative easing experience is instructive in at least two respects: not only does it provide a pedagogical illustration of these mechanisms, but it also demonstrates that the effects of such an approach may not be as automatic and uniform as expected. In this article, we analyse how the tightening of banking regulations and aversion towards securitised products have distorted the effects of quantitative easing on the balance sheets of US resident banks. We therefore build on the work of Ennis and Wolman (2012), Goulding and Nolle (2012, Kreicher, McCauley and McGuire (2013), and McCauley and McGuire (2014).

For various reasons (change of method for calculating the premium paid to the deposit insurance fund, foreign banks' decreased appetite for US securitisations coupled with reduced tendency to rely on US money-market funds), resident banks modified the "natural" effect of quantitative easing on the size of their balance sheets, with some of them (US-chartered banks) reducing it, while others (US branches of foreign banks) increased it. These strategies are reflected in the contrasting movements in the net due of resident banks to their subsidiaries, branches or parent companies established outside the United States. The result is a shift in the ownership structure of reserves with the Fed, with no equivalent distortion of the customer deposits on the liabilities side of banks' balance sheets. As the balance sheet adjustments of some offset those of others, the resultant net effect at aggregate level may have disguised these opposing strategies. The Fed's measures to drain off excess reserves introduced at the end of 2013 should rebalance the ownership structure of reserves.

Quantitative easing and banks' balance sheets: the mechanics

In the United States, the Federal Reserve (Fed) maintained a quantitative easing (QE) policy for nearly six years (from December 2008 until March 2010, from November 2010 until June 2011, from October 2012 until October 2014), consisting of three waves of asset purchases (US Treasuries, debt securities and mortgage-backed securities – MBSs – issued by the Agencies [1]) in the secondary market [2]. This policy automatically inflated the central bank's balance sheet, boosting its securities portfolio on the assets side and the current accounts of resident banks on its liabilities

side (chart 1). The banks' reserves with the Fed therefore showed large surpluses compared with minimum requirements (according to monetary policy[3]): since the start of 2009, reserves in excess of reserve requirements represent around 95% of banks' current accounts with the Fed. These purchases also contributed to the strong growth in customer deposits with the banks.

Substantial excess reserves with the central bank

US resident banks participated more widely in QE as intermediaries on behalf of their customers, and were only marginally involved in the sale of securities held on their balance sheets. Throughout the entire period of the Fed's quantitative easing programme, they even expanded their portfolios of Treasuries and Agencies. If the banks themselves had sold their securities portfolios, QE would simply have resulted in the conversion of assets on their balance sheets (securities against reserves with the Fed), with no impact on the size of their balance sheets (example 1, figure 1) or on the money stock in circulation. Yet, from the end of the third quarter of 2008 until the fourth quarter of 2014, it was mainly US households (which, in US statistics, include hedge funds and private equity funds), the States and local authorities, non-bank financial institutions, notably Government-Sponsored Enterprises (GSEs) and money-market funds, and non-residents that reduced their holdings of Treasuries and/or Agencies (charts 2 and 3). As these agents (apart from the GSEs) do not have accounts with the Fed, the transactions were executed via banks' balance sheets: to settle its purchases (increase in securities held on the asset side of its balance sheet), the Fed credited the banks' current accounts (buildup in banks' excess reserves in the Fed's liabilities and in the assets side of the banks' balance sheets), while the banks credited their customers' accounts (increase in deposits on the liabilities side of banks' balance sheets) (example 2, figure 1). All other things being equal, the Fed's QE therefore tended to increase the size of the resident banks' balance sheets, by increasing their deposits with the central bank and their debts to customers. Whereas the eurozone quantitative easing programme that started at the beginning of this year came in a context where banks' excess reserves were being taxed (0.20% penalty applied to reserves in excess of required reserves), the Fed has been paying interest on excess reserves at a rate of 0.25% since 2008.

QE has swollen US resident banks' reserves at Fed

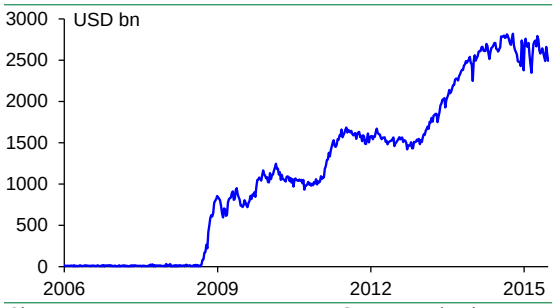


Chart 1 Source: Federal Reserve

Breakdown of Treasuries by ownership sector

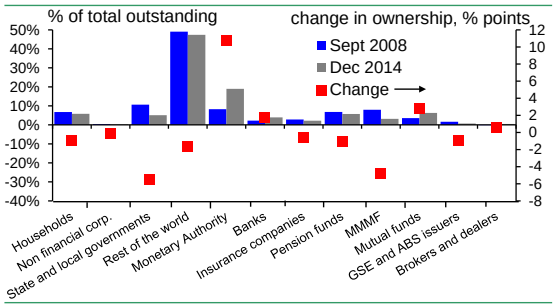


Chart 2 Source: Federal Reserve

Change in ownership of Agency debt and MBS (USD bn)

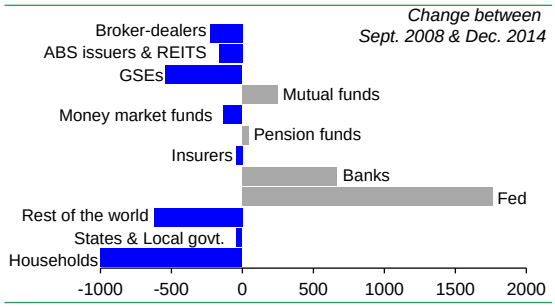


Chart 3 Source: Federal Reserve

Impact of Large Scale Asset Purchases on balance sheets

Example 1: the commercial bank sells 10 securities units to the central bank

Central Bank		Commercial Bank		Customer	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Securities +10	Reserves +10	Securities -10 Reserves +10			
Total assets: +10		Total assets: no change			

Example 2: the commercial bank acts as an intermediary on behalf of its customer (the customer sells 10 securities units to the central bank)

Central Bank		Commercial Bank		Customer	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Securities +10	Reserves +10	Reserves +10	Deposits +10	Securities -10 Deposits +10	
Total assets: +10		Total assets: +10			

Figure 1

In the United States, QE ultimately inflated the monetary base (banknotes, coins, credit institutions' reserves with the central bank), but also the money supply[4] (increase in residents' deposits), a second effect that would have been less noticeable if just the banks, the GSEs (which have accounts with the Fed) and non-residents (whose deposits are not included in the money supply) had sold their securities.

Constant growth in deposits despite credit contraction

As the banks mainly acted as intermediaries, the Fed's purchases of securities broke the link that normally exists, even in an open economy, between (non-securitised)[5] loans and bank deposits (excluding interbank debts and loans). In normal times, at the level of a national banking system, this close relationship stems from the specific characteristics of financing via bank loans: when a bank grants a loan, it creates a new deposit at the same time. In other words, it creates money by crediting its customer's account. This deposit may "travel" towards a current account held by the customer of a different bank (e.g. when the borrower buys a car from the customer of another bank), but at aggregate level, loans and deposits outstanding remain in balance (leaving aside the conversion of deposits into banknotes, or their "leakage" abroad). In the US, the Fed's quantitative easing programme undermined the illustration of the adage that "loans create deposits". From the end of 2008, while banks' outstanding loans contracted temporarily (redemption or cancellation of mortgage loans, fall in production of new loans), deposits continued to grow rapidly (chart 4). The money (deposits) created under quantitative easing disconnected the stock of loans from the stock of bank deposits. This phenomenon can be very simply illustrated by adding to the bank loans outstanding the counterpart of the additional deposits created under QE, i.e. the banks' excess reserves with the Fed (dotted curve in chart 4) (Coppola, 2014).

QE has uncoupled stocks of loans and bank deposits

USD bn, balance sheet figures for commercial banks

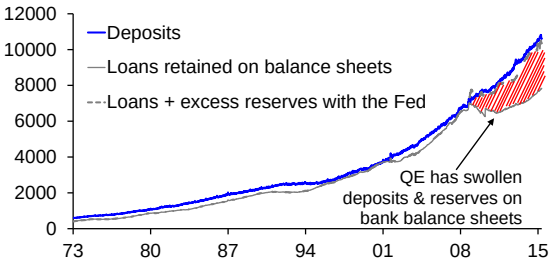


Chart 4 Source: Federal Reserve

Shift in the ownership structure of reserves

An analysis at aggregate level of the impact of QE on banks' balance sheets nevertheless masks some major disparities between resident establishments[6].

Based on an analysis of individual data, Ennis and Wolman (2012) showed that the different monetary policy measures implemented by the Fed (loans to establishments at the end of 2008, first and second waves of securities purchases) had led to a shift in the ownership structure of reserves within the resident banking sector. In fact, while they accounted for less than 10% of bank assets in September 2008, US branches of foreign banks captured 40% of the additional reserves created throughout the period of QE (from Q3 2008 until Q4 2014), but just 8% of deposits (chart 5).

US branches of foreign banks have captured 40% of the excess reserves created by the Fed

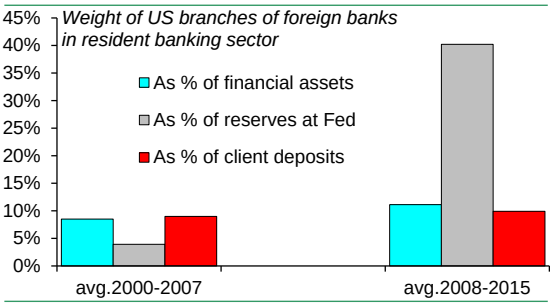


Chart 5 Source: Federal Reserve

For various reasons (changed method for calculating premium paid to deposit insurance fund (FDIC), decreased appetite for US securitisations, desire to reduce dependency on US money-market funds, etc.) the US resident banks modified the "natural" effect of QE on the size of their balance sheets (as described above): the US-chartered banks attenuated the effect (second part of this article), while the US branches of foreign banks intensified it (third part). These strategies are reflected in the contrasting movements in the intragroup net debt of resident banks compared with their branches or parent companies established outside the United States. As the adjustments of some offset the adjustments of others, the resultant net effect at aggregate level disguises these opposing trends (fourth part). The Fed's measures to drain off excess reserves (according to monetary policy) introduced at the end of 2013 should rebalance the ownership structure of reserves (fifth part).

Stable resources grew twice as fast as reserves on US banks' balance sheets

As we mentioned above, purchases of securities by a central bank may be accompanied by an increase in the level of resources considered the most stable (deposits) on banks' balance sheets, but also by an increase in the size of banks' balance sheets. According to Ennis and Wolman (2012) and Kreicher, McCauley and McGuire (2013), this second effect became problematic for US-chartered banks during the second phase of quantitative easing (QE2): when the Fed announced in November 2010 its intention to buy an additional 600 billion dollars of Treasuries in the secondary market, the FDIC at the same time expanded the basis for calculating the premium paid by affiliated banks (in accordance with the recommendations of the Dodd Frank Act). From April 2011, the calculation basis was extended to all the deposit-taking institution's liabilities (excluding shareholders' funds) as against just resident customers' deposits previously. In addition, the premium rate became dependent on the bank's financial solidity (CAMEL rating) and debt structure. Thus, the FDIC's new premium calculation rule reinforced the leverage constraint by increasing the regulatory costs associated with balance sheet size just when a new wave of asset purchases was being launched. Kreicher, McCauley and McGuire (2013) demonstrated that the effects of the size and structure of the balance sheet had played more strongly to the disadvantage of the big banks, which tried to reduce their reliance on wholesale funding. For our part, we interpret QE2 as an opportunity for the US-chartered banks to repay loans from their foreign subsidiaries and branches, and thus to reduce the cost of the deposit insurance.

Regulatory arbitrage and Eurodollar market

Since the 1970s, the big US-chartered banks have been transferring part of the deposits they take from corporations or funds to their branches outside the United States, generally in London or the Caribbean (Kreicher, 1982). These transfers represented a form of regulatory arbitrage comparable to that which triggered credit disintermediation, and they underpinned a rise in the Eurodollar market[7] (dollar-denominated deposits on the balance sheet of a bank established outside the United States or an International Banking Facility[8]) (Goodfriend, 1998; He and McCauley, 2012). The

branch booked this deposit as a liability with regard to its customer and as asset with regard to its parent company in the United States. The latter booked a liability with regard to its branch and increased its reserves with the Fed (Windecker, 1993). Once transferred, such deposits eluded Regulation Q on the payment of interest on deposits (interest ceiling on savings accounts and term deposits until 1986 and ban on paying interest on demand deposits until 2011), and reserve requirements. In addition, they were removed from the calculation basis for the premium paid to the FDIC. This transaction enabled US-chartered banks to remain competitive with the high returns offered by the non-banks (notably the mutual funds in the 1970s and 1980s) and to improve their net margin on resources by reducing the regulatory costs associated with deposit taking. This boosted the net debtor position of the US-chartered banks to their foreign subsidiaries and branches (charts 6 and 7).

Transactions of US-chartered banks with foreign affiliates

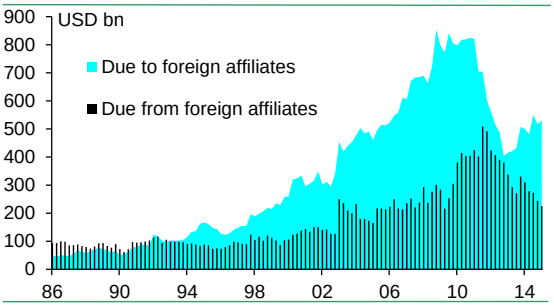


Chart 6 Source: Federal Reserve

US-chartered banks' net funding inflows from offices abroad

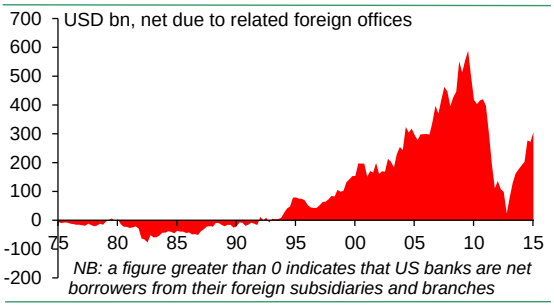


Chart 7 Source: Federal Reserve

The effects of changing the FDIC premium calculation

At the end of 2010, the enlargement of the calculation basis to total assets and the introduction of a penalty in proportion to their reliance on wholesale funding prompted the banks to repay their debts to their foreign subsidiaries or branches. Since intergroup loans had fallen within the scope of the resources used to calculate the premium, there was less justification for US-chartered banks to replace customer deposits with intragroup debts. The launch of QE2, and the boost to reserves that it triggered, enabled the US-chartered banks to repay this debt. The decline in intragroup debt was accompanied by an increase in deposits held on the balance sheet ("destruction" or repatriation of Eurodollars), specifically at the big banks. Based on data from the Bank for International Settlements (BIS) and the FFIEC's Call Reports, McCauley and McGuire (2014) demonstrated that, in a symmetrical fashion, the dollar exposure of their foreign subsidiaries or branches (deposits net of loans to customers) declined significantly between the start of 2011 and the end of 2012. In October 2012, the net debt of US-chartered banks to their corresponding foreign entities was virtually zero, compared with around 590 billion dollars at its peak in September 2009. In just three years, the US-chartered commercial banks therefore repaid debts that had been accumulating over nearly thirteen years (chart 7). For the same reasons (FDIC premium, leverage constraint, reserves in excess of reserve requirements), activity in the federal funds market[9] dried up, particularly in the interbank market (non-collateralised or collateralised). Ultimately, the effect of quantitative easing on the US-chartered banks was that growth in deposits (net of loans) was twice as fast as growth in reserves (charts 8 and 9). The result was an increase in deposits as a percentage of US-chartered commercial banks' total assets, well above European levels (chart 10).

Financial assets of US-chartered commercial banks

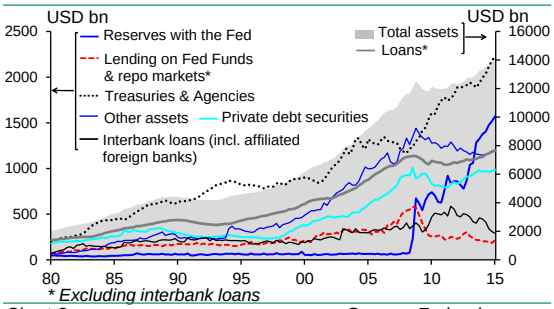


Chart 8 Source: Federal reserve

Financial liabilities of US-chartered commercial banks

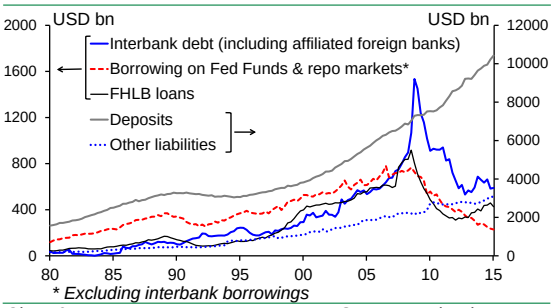


Chart 9 Source: Federal Reserve

Deposits cover 3/4 of US commercial bank assets

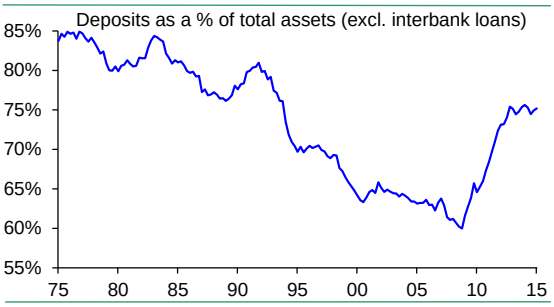


Chart 10 Source: Federal Reserve

In striving to minimise the cost of the FDIC premium, the US-chartered banks dampened the impact of QE on their stock of reserves and the size of their balance sheets. This was not the case for the US branches of foreign banks, which are mostly not affiliated to the deposit insurance system, as they do not take deposits from retail customers (see box) and are therefore not required to pay the FDIC premium.

The US branches of foreign banks have captured 40% of the excess reserves created by QE

The second phase of quantitative easing was accompanied by a shift in the ownership structure of reserves at the central bank (chart 11) without an equivalent shift in the ownership structure of deposits (chart 5). In March 2011, the US branches of foreign banks held 640 billion dollars of reserves (40% of their balance sheet), double the level of the previous year. The weight of their reserves jumped to 46% of the reserves of all deposit-taking institutions (40% on average between 2008 and 2014)[10] compared with 2% in June 2008 (4% on average between 2000 and 2007), a level disproportionate to their weight in total bank assets (11% in March 2011 vs 10% three years earlier).

Shift in the ownership structure of reserves

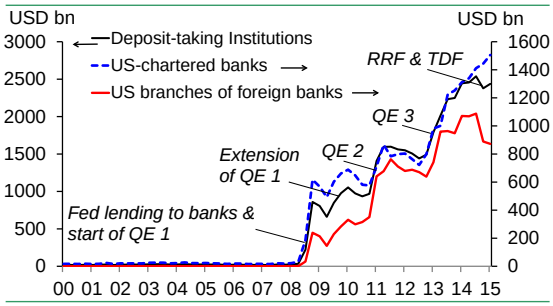


Chart 11 Source: Federal Reserve

Box: Foreign banks' branches in US statistics

International banks establish their activities abroad via subsidiaries or branches. Subsidiaries are corporate entities that are legally distinct from their parent and are generally regulated and supervised by the authorities of the host country, which is not the case for branches. Some countries restrict the activities of foreign banks' branches located in their territory, the United States being an example (see below). Canadian, UK, Japanese, French and German institutions are among the largest foreign banks operating in US territory.

In the Fed's statistics, the financial accounts of US depository institutions (the equivalent of credit institutions in the eurozone) are established on a parent-company basis according to the residency principle. It follows that only the financial assets (and liabilities) of deposit-taking institutions that are resident in US territory are entered in the

accounts (even if these institutions are controlled by foreign banks). The uses (and sources) of the banks affiliated to them (parents, subsidiaries or branches) but located outside the United States, together with the assets (and liabilities) of other non-resident agents, form the "Rest of the World" sector. The accounts of each of the institutional sectors are consolidated (eg the credits and debts between resident commercial banks are netted). The data published by the Fed (Financial Accounts of the United States, Table H8) enable us to distinguish two types of commercial bank within the resident banking sector: 1) banks governed by US law (a subsector encompassing US-chartered banks and US subsidiaries of foreign banks) and 2) the US branches of foreign banks.

The Fed does not draw up a separate account for the US subsidiaries of foreign banks. Nevertheless, based on data from the FFIEC's Call Reports, Goulding and Nolle (2012) note that their balance sheet structure is fairly similar to that of the US-chartered commercial banks (unlike the branches: see below). Moreover, they represent a much smaller share than the branches, accounting for one-third of the assets of foreign banks with a presence in the US, compared with two-thirds for branches.

In the United States, with a few exceptions[11], the branches of foreign banks are not affiliated to the FDIC: they are not authorised to take deposits from retail customers and the deposits of their clients (corporates) are not guaranteed. These establishments obtain their funding mainly from the wholesale markets, i.e. with resources considered to be less stable than retail customers' deposits. Therefore, while deposits remain the main source of funding for branches, as with the US-chartered banks, 80% of them consist of deposits that exceed the guarantee limit (250 billion dollars) compared with less than 10% at the US-chartered banks. The rest of their debt consists of loans from the fed funds market or the collateralised loan market (repurchase agreements or repos: cash loans in exchange for securities with an obligation to buy them back in the future). Their loan portfolios are therefore more oriented towards corporate clients (since the start of the 2000 decade, commercial and industrial loans outstanding have on average accounted for 90% of their loan portfolios in the non-financial sector). Like the US-chartered commercial banks, they can refinance themselves from the Federal Reserve and they have a current account.

A means of access to the dollar

According to BIS statistics, foreign banks' loans to US residents (based on their consolidated balance sheets) amounted to more than 6,000 billion dollars before the financial crisis (McCauley and McGuire, 2014). Some of the European banks among them were raising funds in dollars from US money-market funds (mainly in the form of certificates of deposit and commercial paper) via their US branches in order to minimise their exposure to exchange rate risks (Baba, McCauley and Ramaswamy, 2009). These funds were invested in long-term securities or securitisations (securities backed by mortgages, car loans, credit cards, student loans, etc.).

From the start of the 2000 decade, net loans from branches to their parents gradually increased, reaching 600 billion dollars in mid-2008, i.e. 49% of the aggregated balance sheets (excluding interbank loans) of these institutions[12] (charts 12, 13 and 14). In a symmetrical fashion, the deposits taken by these branches grew by around 685 billion dollars between December 1999 and June 2008. These practices added to the "round trip" of dollar funds (He and McCauley, 2012) and helped to inflate the balance sheets of branches located in the US. The less severe regulatory framework of the time (Basel 2) and the lack of constraints on size or leverage for banks regulated outside the US may have contributed to this process.

Transactions of US branches of foreign banks with foreign affiliates

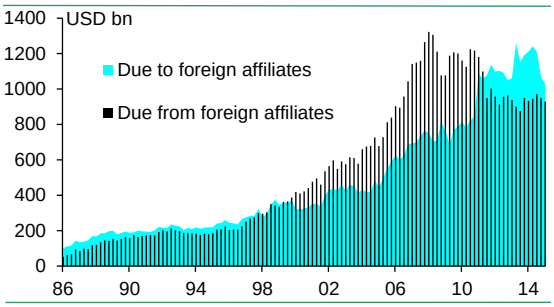


Chart 12 Source: Federal Reserve

Financial assets of US branches of foreign banks

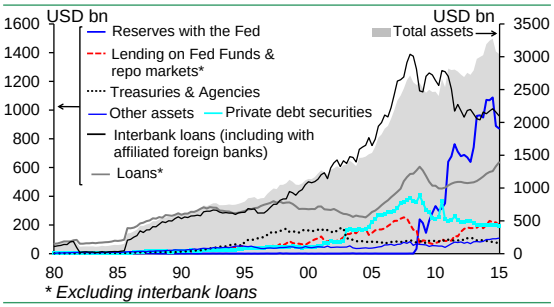


Chart 13 Source: Federal Reserve

Reduced use of money market funds has temporarily obscured effects of QE on deposits

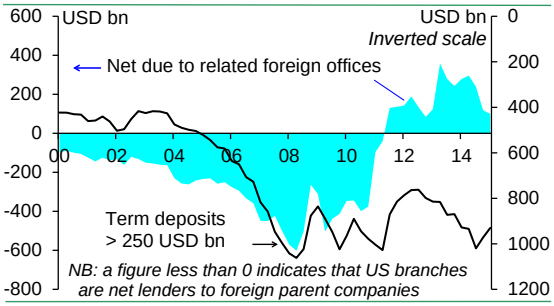


Chart 15 Source: Federal Reserve

Financial liabilities of US branches of foreign banks

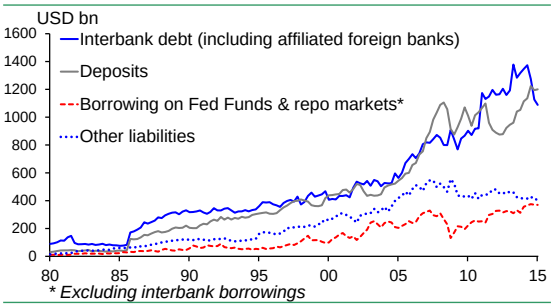


Chart 14 Source: Federal Reserve

Net debt of US branches of foreign banks and Fed reserves

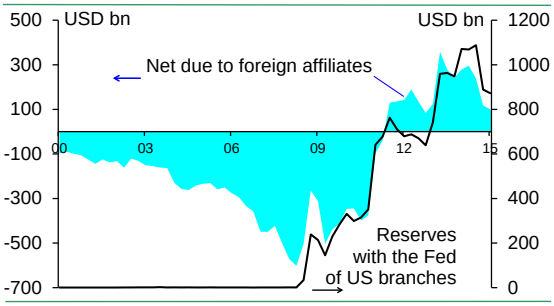


Chart 16 Source: Federal Reserve

From net lenders to net borrowers

However, starting in 2011, the net position of branches vis-à-vis their parents changed radically: having been net lenders, they became net borrowers. In one year, in absolute terms, their net position contracted by 512 billion dollars, from a net credit of 376 billion in December 2010 to a net debt of 130 billion in December 2011. The result was less recourse to money-market funds, which may have obscured the effect of QE on their customers' deposits: the deposits booked on the liabilities side of their balance sheets therefore evolved fairly erratically and only really started to grow in 2012 (chart 15). From 2011, the branches amplified the effect of QE on their stock of reserves by borrowing from their parents (chart 16). Thus, while the branches had captured one-third of the reserves created in QE1, this proportion rose to more than 50% in QE2 (more than two-thirds from September 2010 to September 2012).

These mechanisms can be illustrated by a graph such as shown in chart 4 above. In contrast to what may be observed at aggregate level, simply accounting for the reserves created by QE does not enable us to reconcile the trend in loans and deposits booked in the balance sheets of foreign banks' branches (chart 17). Obviously, the deposits created by a new loan (or by QE) move from one bank's balance sheet to another's, or from one institution to another; but in the case of branches, a clear disconnect between the deposits and loans on their balance sheets emerged at the start of the 2000 decade, i.e. from the moment when they increased their net credit position vis-à-vis their parent companies (and financed these loans by borrowing from money-market funds, mainly). Thus, the trends in loans and deposits on the balance sheets of branches may be reconciled, at least until just before quantitative easing, by adding to the loans the counterpart of the liquidity lent to the parent companies, i.e. the branches' net loans to their parent companies (chart 18). From 2008, accounting for the

counterpart of deposits created in the context of QE, and from 2011 for liquidity borrowed from parent companies, gives a more coherent picture of the respective trends for loans and deposits (chart 19).

Simply accounting for reserves does not allow the reconciliation of stocks of loans and deposits

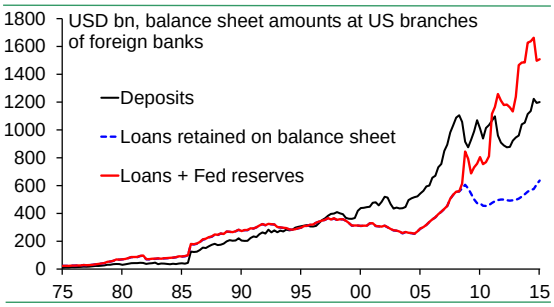


Chart 17 Source: Federal Reserve

The increase in net intra-group lending has uncoupled the stock of bank loans and deposits since 2000

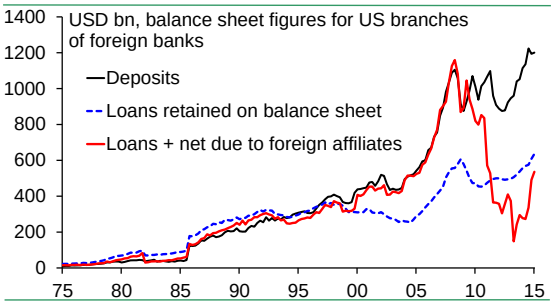
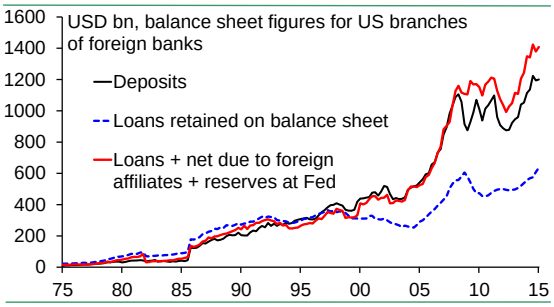


Chart 18 Source: Federal Reserve

Reconciliation of outstanding loans and bank deposits



Graph 19 Source: Federal Reserve

While foreign banks' US branches all substantially increased their reserves with the Fed from 2011 (particularly branches of Japanese, Swiss and UK banks) and reduced their net loans to their parents, only the branches of eurozone banks reduced their balance sheets and became net borrowers from their parents (Kreicher, McCauley and McGuire (2013), McCauley and McGuire (2014)). At the European banks, a reduced appetite for US securitisations, the Fed's securities purchase programme, a desire to reduce dependency on money-market funds (whose funding proved unstable when the financial crisis broke), as well as a desire to boost dollar-denominated liquid assets, led to a deleveraging of bank balance sheets in dollars (at both branch level and consolidated level) and a shift in the assets held by the branches (in favour of reserves with the Fed). Therefore, while other factors may also have played a role[13], it seems that foreign banks' reduced reliance on the resources raised by their branches has been accompanied by a contraction in the securitisation portfolios held by non-residents (chart 20). Unsurprisingly, however, the orders of magnitude are very different: first, because the foreign banks had not financed these purchases solely via their branches in the US; and second, because the non-resident sector is much larger than just the foreign banks that have US branches. Data collected by the US Treasury and the Federal Reserve on foreigners' ownership (taking all counterparties together) of securities issued by US residents illustrates the decline in securitisation portfolios, particularly those held by Europeans, since the financial crisis (chart 21).

Shrinking securitisation portfolios of non-residents

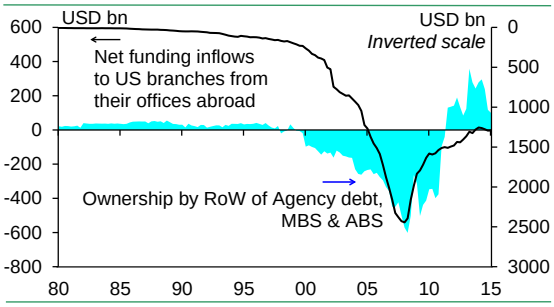
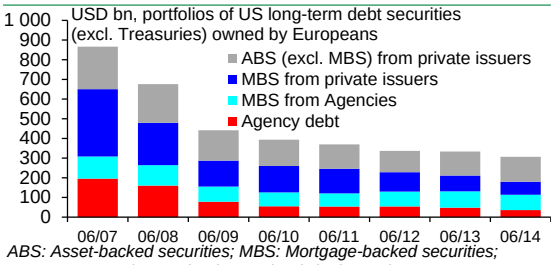


Chart 20 Source: Federal Reserve

Shrinking of portfolios of US securitisations owned by Europeans



ABS: Asset-backed securities; MBS: Mortgage-backed securities; Mortgage agencies: Federal agencies (Ginnie Mae) & GSEs (Fannie Mae, Freddie Mac, FHLB)

Chart 21 Sources: US Treasury,Federal Reserve of New York,Fed

Net inflow of funds via crossborder intragroup debt

Apart from their primary purpose (providing access to funding in foreign currencies, ensuring geographical diversification for commercial activities and investments, etc.), foreign branches are also factors that allow for the absorption or amplification of shocks. Thus, while an analysis of the aggregated balance sheets of resident banks allows us to assess the effects of quantitative easing on banks' reserves and deposits (see first part of this article), it ignores the massive shift in net intra-group positions that QE has triggered.

As the net debt of some (the US banks) offsets the net credits of others (the branches of foreign banks), the net position of US domestic commercial banks to their foreign parent companies, subsidiaries and branches remained close to zero until the end of 2010 (see area shown in chart 22).

Under the combined effect of quantitative easing and the change to the FDIC premium calculation, the flow of parent companies' repayments of crossborder intra-group loans, which was more rapid at the foreign banks than at the US-chartered banks (see area shown in chart 6 and histogram in chart 12), helped to increase the net debt of all the resident commercial banks. This trend was prolonged by the net inflow of intragroup funds via the balance sheets of US branches of foreign banks as from 2011, and via those of US-chartered commercial banks as from 2013 (dotted curve and solid curve in chart 22).

The trend observed since 2013 for US-chartered banks (return to net debtor position) is probably not unrelated to the Basel Committee's finalisation of the short-term liquidity norm (LCR, liquidity coverage ratio)[14]. This requires banks to hold enough liquid, unencumbered, high-quality assets to cover the net cash outflows triggered by a serious 30-day crisis. The assets considered to be the most liquid (those that can be converted into cash in private markets without losing – or losing very little of – their value) include reserves at the central bank and debt instruments issued – or guaranteed – by sovereigns, such as Treasuries and Agencies[15]. The US-chartered banks expanded their portfolios of Treasuries and Agencies by nearly 320 billion dollars between the end of 2012 and March 2015 (chart 8), purchases that they financed by borrowing from their foreign branches or subsidiaries (+260 billion) and the Federal Home Loan Banks (+90 billion) (chart 9).

All in all, the net debt of all commercial banks resident in the US to their parent companies, subsidiaries and branches abroad amounted to around 400 billion dollars at the start of 2015 (see area shown in chart 22)[16]. Based on the consolidated balance sheets of foreign banks with activities in the US (FFIEC Call Reports) and statistics from the BIS, McCauley and McGuire (2014) observed that in 2011 the increase in net lending in dollars by foreign parent companies to their US branches had not been offset by a contraction of the same order in their net loans to any other counterparty (in the US or elsewhere). They deduced from this that this lending had been financed by converting foreign currency-denominated resources into dollars. This interpretation was confirmed by the increase in yen, euro and sterling swaps into dollars during 2011. They thus concluded that, counter-intuitively, the Fed's QE had been accompanied by an inflow of funds via the Eurodollar market.

Net debt of some offset by net credits of others over the long term

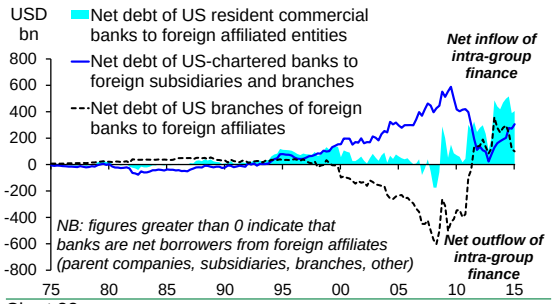


Chart 22 Source: Federal Reserve

Towards a rebalancing of the reserve ownership structure

The unprecedented increase in banks' excess reserves triggered by quantitative easing exerted downward pressure on money-market rates[17]. Eager to regain control over short-term rates[18], the Federal Reserve has been testing two alternative methods for draining off excess reserves: the Term Deposit Facility (TDF) and the Reverse Repo Facility (RRF)[19] since September 2013. The resulting contraction in reserves is only perceptible at the US branches of foreign banks.

The Term Deposit Facility (TDF)

This method consists in offering to convert banks' reserves into term deposits (figure 2). To make this more of an incentive than it was when launched in September 2013, the Fed made a timely change as from October 2014 to the characteristics of the term deposits that the banks may take up under TDF. The initial offers had in fact been in breach of banking regulations: in October 2013, the proposed LCR short-term liquidity rule (see above) stated that term deposits offered under TDF would be ineligible for the range of liquid assets covered by the LCR. This rule, which indicated that part of the term deposits could meet the inclusion criteria provided that early withdrawals were authorised, was finalised in September 2014; shortly afterwards, in October, the Fed announced the introduction of new term deposit offers at 6, 7 or 8 days, but this time with early drawing rights.

Impact of the Term Deposit Facility on balance sheets : conversion of reserves into term deposits

Central Bank			Commercial Bank			Customer	
Assets	Liabilities		Assets		Liabilities	Assets	Liabilities
	Reserves	-10	Reserves	-10			
	Term deposits	+10	Term deposits	+10			
Total assets: no change			Total assets: no change				

Figure 2

This change enables banks to participate in the scheme without causing a deterioration (or improvement) in their LCR liquidity ratio (conversion of reserves into term deposits). Helped by a more attractive return, the amounts converted reached 400 billion dollars in December 2014 and again in February 2015 with an interest rate of 30bp in December and 28bp in February, compared with 25bp for excess reserves (chart 23).

Participation in the Fed's two programmes is substantial

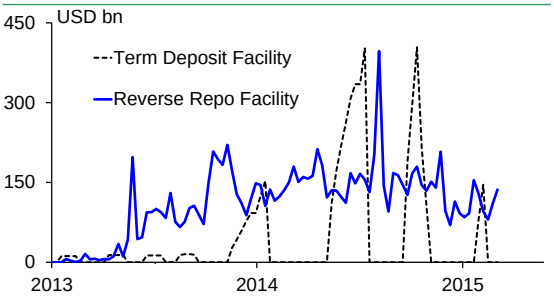


Chart 23 Source: Federal Reserve

The Reverse Repo Facility (RRF)

The second method for draining off liquidity consists in performing repurchase transactions on Treasuries[20] (sale with obligation to repurchase in future) at a fixed rate (between 0.01% and 0.10%), with a cap on the amount permitted (30 billion dollars per counterparty since September 2014 vs 500 million dollars initially in the case of overnight transactions) and with an extended list of counterparties: 24 deposit-taking institutions, 22 primary dealers, 12 GSEs and 105 money-market funds. By means of this facility, a bank or non-bank extends a guaranteed loan (cash against Treasuries) to the Fed[21]. As in the case of the purchase of securities by the Fed, a repo transaction always (unless the counterparty is a GSE) passes through a bank's balance sheet, whether the counterparty is a final counterparty of the Fed (example 1 in figure 3) or not (example 2 in figure 3), since only banks and GSEs have a current account with the central bank. At the end of the transaction, the size of the central bank's balance sheet is unchanged, but the composition of its debt is different (reverse repos versus reserves)[22] and the account of its counterparty is debited

(reserves of deposit-taking institutions). When a commercial bank itself contracts a repurchase agreement with the Fed, the transaction results simply in the conversion of assets on its balance sheet (repo vs reserves), with no impact on the size of its balance sheet (example 1 in figure 3). When the Fed's counterparty is a non-bank (eg a money-market fund), the commercial bank debits its client's account (example 2 in figure 3). All other things being equal, at the end of the transaction, the size of the bank's balance sheet is reduced in this case.

Impact of the Reverse Repo Facility on balance sheets

Example 1: the commercial bank itself contracts a repurchase agreement with the central bank

Central Bank

Assets	Liabilities
	Repo +10
	Reserves -10

Total assets: no change

Commercial Bank

Assets	Liabilities
Repo +10	
Reserves -10	

Total assets: no change

Customer

Assets	Liabilities

Example 2: the commercial bank acts as an intermediary on behalf of its customer (eg a money-market fund)

Central Bank

Assets	Liabilities
	Repo +10
	Reserves -10

Total assets: no change

Commercial Bank

Assets	Liabilities
Reserves -10	Deposits -10

Total assets: -10

Customer

Assets	Liabilities
Repo +10	
Deposits -10	

Figure 3

Overnight transactions have been conducted every working day since September 2013 (the volume of each daily transaction has been capped at 300 billion dollars since September 2014). In addition, around ten term transactions (between 1 and 4 weeks) have been performed since December 2014 (the ceiling for the cumulative volume of overnight and term transactions varies from 310 to 600 billion dollars[23]). The scheme will be tested until at least 30 January 2016. The transactions are generating significant levels of participation. On average, since September 2013, 100 billion dollars in cash are "lent" each day to the Fed in overnight transactions (chart 24). Aggregating the overnight and term repo transactions, and given the limits set by the Fed, outstandings have averaged 135 billion dollars each day since the start of December 2014. Record levels of demand have been recorded at the end of the quarter reflecting specific requirements when participants close their quarterly accounts (see above and chart 25).

While the first method (Term Deposit Facility) at best has no effect on institutions' LCRs, the second (Reverse Repo Facility) is likely to produce opposite effects to QE on banks' balance sheet and regulatory ratios (by reducing the volume of high-quality liquid assets according to LCR norms, but by alleviating the leverage constraint).

Strong demand for overnight reverse repo operations...

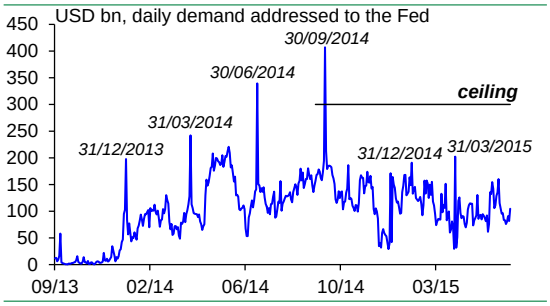


Chart 24 Source: Federal Reserve of New York

... overnight reverse repo and term operations since launch at end-2014

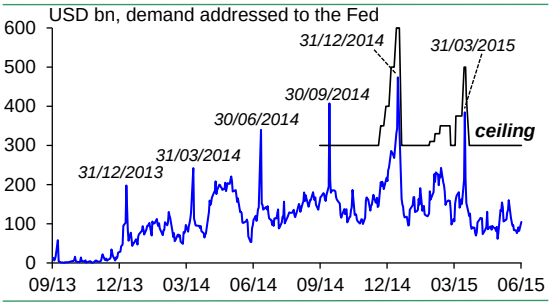


Chart 25 Sources: Federal Reserve of New York, BNP Paribas

MMFs - the Fed's main counterparties

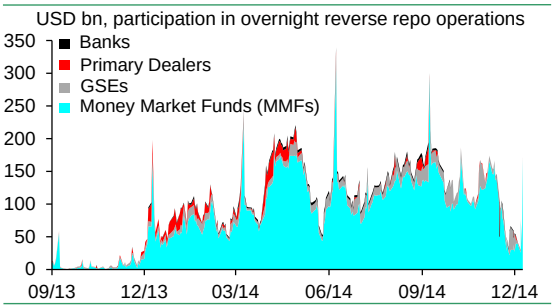


Chart 27 Source: Federal Reserve of New York

Strong participation by money-market funds (MMFs)

Since mid-October 2014, banks' reserves with the Fed have tended to decline (chart 1) under the combined effect of TDF and RRF, and from the end of QE3 in October (chart 26). The Fed executes most of its reverse repo transactions (through the intermediary of the banks) with money-market funds (MMFs), which alone are incentivised to participate [24] (chart 27). As the transactions are guaranteed by Treasuries, MMFs-Government and MMFs-Treasury are the Fed's main counterparties, whereas MMFs-Prime [25], which diversify their securities portfolios more widely, participate more actively in end-of-quarter transactions (chart 28). The success of the RRF reflects not just money-market funds' need to redirect their excess liquidity, but also the impact of banking regulation (leverage ratio, reliance on wholesale financing penalised by LCR and systemic capital surcharge). The penalty imposed on institutional clients' deposits (hedge funds, private equity funds) announced by major US banks such as JP Morgan in February could redirect these depositors' liquidity towards the MMFs, then from the MMFs towards the Fed, thereby supporting the scheme.

Weighting of the various participants

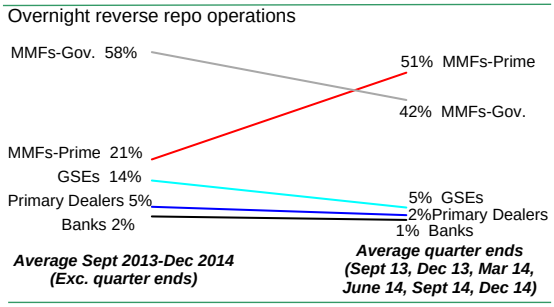


Chart 28 Source: Federal Reserve of New York

Draining off excess liquidity

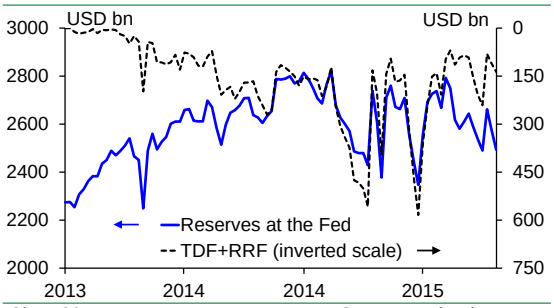


Chart 26 Source: Federal Reserve

Decline in the reserves of foreign banks' branches

In the United States, the impact of reverse repo transactions on reserves with the central bank is perceptible only via the balance sheets of foreign banks' branches: unlike the US-chartered banks, they have seen their reserves with the Fed decline since the fourth quarter of 2014 (chart 11). Obviously, as the LCR liquidity constraint also applies outside the US, foreign banks must strive to preserve liquid assets in the form of reserves at the central bank (notably in dollars, in the case of eurozone banks, in order to avoid the penalty). The implementation of reverse repo transactions with money-market funds should gradually reduce the shift in the ownership structure of reserves, however (the reserves of foreign banks' branches represented 36% of the reserves of all deposit-taking institutions at end-March 2015 compared with 48% in mid-2013). At the end of the quarter, the additional liquidity lent by money-market funds to the Fed under the RRF coincides particularly well with the fall in short-term financing

(certificates of deposit, term deposits, repos) provided by these funds to European banking groups, including their branches (chart 29).

Money market fund participation in the RRF and short-term financing of European banks

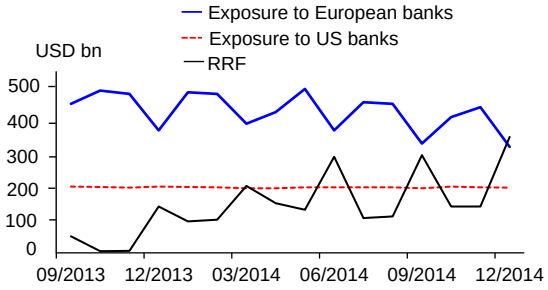


Chart 29 Source: Fitch

In the US, quantitative easing was accompanied at aggregate level by an unprecedented increase in banks' reserves with the central bank and in customer deposits. Nevertheless, an analysis of the shift in bank balance sheets reveals that the extra amount of stable resources (customer deposits) more specifically benefitted the US-chartered banks, while the additional liquid assets created (cash at the central bank) were disproportionately – relative to their weight in banking assets – captured by the US branches of foreign banks. Pursuing different objectives, the former repaid the funds borrowed from their foreign branches, while the latter repatriated the funds lent to the extent of becoming net borrowers from their parent companies. The result has been the effects outlined above.

Before the Fed launched its purchasing programme, US-chartered banks' intragroup net debt was of an equivalent amount to that of the net credit of foreign banks' branches. The effects of their joint extinction therefore offset one another and the impact of these opposing strategies remained negligible at aggregate level. It would have been different if the basis for the FDIC premium calculation had not been changed, or if the foreign banks had not wanted to boost their holdings of dollar-denominated liquid assets. Although it is too early to analyse the impact, it appears that this same type of programme will represent a challenge for the eurozone banks, while the new regulatory context (leverage constraint, G-SIB surcharge, total loss absorbing capacity) obliges them to trim their balance sheets.

The repurchase programme being implemented by the Federal Reserve since 2013 (*Reverse Repo Facility*) opens, so to speak, an account in its balance sheet for money-market funds, which can deposit their excess liquidity there against collateral, on certain conditions and within limits set by the central bank. In this way, the Fed "freezes" the liquidity created in QE by replacing banks' reserves with money-market funds' "deposits". It thereby frees up space in bank balance sheets and indirectly limits the role of money-market funds in the financing of the economy. With 48% of reserves at the central bank owned by foreign banks (via their US branches) in June 2013, the Fed is no doubt also indirectly aiming to adjust the shift that quantitative easing triggered in the ownership structure of reserves, and thus in the monetary base.

Completed, 30 June 2015

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NOTES

[1] *Agencies created by the Federal Government for the purpose of refinancing mortgage loans in the secondary market. They include federal agencies benefiting from an explicit guarantee from the Federal Government (such as Ginnie Mae) and private agencies (the Government-Sponsored Enterprises: Fannie Mae, Freddie Mac and the Federal Home Loan Banks).*

[2] *Cf. d'Arvisenet, P., De Lucia, C., Estiot, A. and Newhouse, C. (2012),* The Maverick, the Old Lady and the Converted, *Conjoncture, November 2012, BNP Paribas publication.*

[3] *According to the reserve requirement, the banks must hold reserves with the central bank in proportion to their customers' deposits. This excess liquidity, according to monetary policy, may however mask a liquidity deficit according to the LCR regulatory requirement (short-term liquidity requirement). This is notably the case in the eurozone where the shortfall in liquid assets (which includes a wider range of assets than just excess reserves) amounted to 115 billion euros under LCR (data as at 30 June 2014) whereas the reserves built up at the ECB (in current accounts or deposit facilities) exceeded the reserve requirement by around 139 billion euros.*

[4] *Second-round effects may reduce or reinforce the direct effects of QE on the money supply: reduce them if for example a US hedge fund sells 10 securities units to the Fed and then invests its 10 units of additional deposits in securities issued by a non-resident non-financial company; reinforce them if for example a non-resident sells securities to the Fed and then invests its new liquidity in securities issued by a resident non-financial company (which sees its deposits increase). As the liquidity circulates between agents, the final holders of deposits created under QE are not directly identifiable.*

[5] *In the United States, the strong rise in loan securitisation since the 1980s has created a decorrelation between the trend in total loans outstanding (loans retained on banks' balance sheets and loans sold to securitisation vehicles) and the trend in bank deposits, with part of the savings previously created by the bank credit having been captured by new investment products issued by the securitisation vehicles (loan-backed securities).*

[6] *We focus our analysis on the commercial banks, which account for 98% of deposit-taking institutions' reserves with the Fed (in other words, we exclude the credit unions); among the resident institutions, we distinguish between the US-chartered banks and the US branches of foreign banks (see box).*

[7] *A Eurodollar deposit may be created, for example, when a company withdraws a dollar-denominated deposit placed with a US-chartered bank (bank A) to then place it with the branch of another US-chartered bank (bank B) located outside the United States. Bank B books this Eurodollar on its liabilities side as a debt to customers and on its assets side as a credit with regard to its parent company in the United States. The latter books a debt to its branch (bank B) in its liabilities and increases its reserves with the Fed. Bank A's debt with regard to the company and its reserves with the Fed are reduced. Ultimately, the creation of a Eurodollar deposit simply moves Fed reserves from one US-chartered bank (bank A) to another (parent company of bank B) (Windecker, 1993).*

[8] *Since 1981, most US deposit-taking institutions may establish an IBF (international banking facility) in US territory. With a few exceptions, an IBF offers the same services as a commercial bank (loans, term deposits) but exclusively to non-residents, other IBFs or other entities (resident or non-resident) of the banking group controlling the IBF (Chrystal, 1984). IBFs are not subject to the regulations applicable to the activities of domestic commercial banks (reserve requirement, possible ceilings on interest rates, deposit insurance premium).*

[9] *Market in which institutions holding an account with the Fed (banks, primary dealers, GSEs) trade their deposits and central bank reserves. Given reduced demand, the deposits of the GSEs (traditionally net sellers of federal funds) with the Fed have increased since 2008.*

[10] *The withdrawal of US money-market funds in the summer of 2011 temporarily dried up the European banks' sources of refinancing in dollars and caused a contraction in the reserves of the US branches of European banks with the Fed.*

[11] *Ten branches of foreign banks (out of around 250) were authorised to maintain their affiliation to the FDIC and to accept deposits from individuals after promulgation of the International Banking Act of 1978.*

[12] *Whereas in 2008-2009 the financial crisis temporarily shut off access to certain markets on which the branches were dependent (they partially circumvented this by borrowing from the Fed), swap agreements between central banks subsequently enabled foreign banks to obtain dollar financing directly from their central bank, so that the branches' net loans to their parent companies temporarily dried up. Then, in the summer of 2011, the withdrawal of US money-market funds temporarily dried up the European banks' sources of dollar refinancing and again reduced the branches' net loans.*

[13] *Especially as the fact of having financed these purchases from specific resources does not imply an obligation to reduce specifically these resources upon their disposal.*

[14] *A translation of the Basel LCR standard was proposed in the US in October 2013 and the finalised rule in September 2014.*

[15] *On the grounds that the GSEs (Fannie Mae, Freddie Mac and the Federal Home Loan Banks) benefit from an "effective" government guarantee (as opposed to the "explicit" and unconditional guarantee for Treasuries or securities issued by Federal Agencies such as Ginnie Mae), the debt securities for – or guaranteed by – the GSEs (excluding preferred securities) are accounted for, if they satisfy the OCC's 'investment grade' criterion, in the range of level 2A liquid assets, after application of a 15% discount.*

[16] *The fact that this volume is negligible compared with resident commercial banks' aggregated balance sheets (around 16,000 billion dollars at 31 March 2015, excluding interbank loans) means that by just adding excess reserves to bank loans the trend in loans can be approximately aligned with the trend in deposits (chart 4). The same applies to just the US-chartered banks.*

[17] *For an analysis of the new challenges for US monetary policy, see Estiot, A. (2014),* A whiter shade of pale, *Conjoncture February 2014, BNP Paribas publication, and Estiot, A. (2014),* The truth is out there, *Conjoncture October-November 2014, BNP Paribas publication*

[18] *In order to keep control of short-term rates, the Fed paid interest (0.25%) on the banks' excess reserves from 2008. The rate of interest on excess reserves (IOER) was to act as a floor for the effective rate on Federal funds, as the banks had no interest in lending each other central bank money at a rate below the IOER rate. Nevertheless, the GSEs, which hold accounts with the Fed but are not authorised to receive interest on these accounts, continued to lend liquidity at rates below the IOER, which pushed short-term rates downwards. Moreover, volumes traded in the Federal Funds market remained modest because of low demand from the banks (large excess reserves, enlargement of the basis for calculating the FDIC premium in 2011, leverage constraint).*

[19] *We discussed these two methods in a previous article:* The leverage ratio – the appearance of simplicity, *Conjoncture June 2014, BNP Paribas publication.*

[20] *The Fed's balance sheet (4,488 billion dollars) included around 2,461 billion dollars of Treasuries in mid -June.*

[21] *According to some commentators, this facility represents the first step in the evolution of the Fed's role towards that of a "dealer of last resort".*

[22] *The Fed defines the transaction according to its effect upon its counterparty. Therefore, from the Fed's point of view, a reverse repurchase agreement is similar to a collateralised loan and booked on the liabilities side of its balance sheet.*

[23] *If the volume of demand remains below the ceiling set, all participants will be served at the "offering rate" (0.05%); if it exceeds the ceiling, the rate applied is the "stopout rate" (rate at the level where the volume offered corresponds to the maximum authorised).*

[24] *While the interest rate on these transactions remains below the IOER rate on excess reserves, the banks will have little incentive to participate. The facility may obviously be attractive to those looking for high-quality collateral in order to refinance themselves or to meet initial margin requirements; however, at prudential level, excess reserves and Treasuries (as well as repos guaranteed by Treasuries) benefit from an equivalent treatment (the most favourable): trading central bank money for high-quality liquid assets such as Treasuries would have no impact on solvency or liquidity ratios (CET1, LR, LCR or NSFR). Moreover, while the RRF interest rate is similar to an IOER for non-banks, the participation of GSEs is limited for technical reasons (notably settlement frequency). Thus, the programme involves mainly (more than 80%) money-market mutual funds (MMFs), which redirect their excess liquidity towards the central bank's balance sheet (access to quality counterparty and collateral, facilitated compliance with SEC requirements).*

[25] *The MMFs-prime invest mainly in non-government securities, unlike the MMFs-government. The MMFs-treasury are only authorised to invest in Treasuries.*

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