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Structural liquidity

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*The views expressed in this article are the views of the author and do not necessarily reflect the views of Norges Bank

STRUCTURAL LIQUIDITY

Ellen Aamodt and Kristian Tafjord[1]

Structural liquidity refers to the level of reserves in the banking system prior to market operations by Norges Bank to supply or drain reserves from the banking system. Only the central bank can create reserves. However, transactions undertaken by the government, which has an account at Norges Bank, can influence structural liquidity. Daily variations in structural liquidity are primarily determined by transactions of this kind between the government and its counterparties with accounts at private banks. This commentary discusses the factors that influence structural liquidity, what determines the level and why currently, structural liquidity is occasionally positive. We conclude with a comment on the structural liquidity forecast for 2014.

1. Background

The aim of Norges Bank's liquidity policy is to implement the Executive Board's interest rate decision by ensuring that short-term money market rates remain close to the key policy rate. This requires a system for managing bank reserves. Bank reserves are banks' deposits with the central bank. They are referred to as "central bank reserves", "reserves" or "bank liquidity", and appear on the liabilities side of the central bank's balance sheet. Chart 1 is a condensed version of Norges Bank's balance sheet.[2]

Chart 1. The largest items on Norges Bank's balance sheet.

Assets	Liabilities and equity
Lending to banks	Deposits from banks
Foreign exchange reserves Long term portfolio Money market portfolio Buffer portfolio	Deposits from the Treasury Notes and coins
Foreign currency investments for the GPFG	Krone account for the GPFG
Other assets	Equity

Only the central bank may create reserves. Norges Bank can create reserves in two ways, either by purchasing foreign exchange or securities[3] from economic agents (in which case the central bank pays with reserves), or by lending funds (reserves) to banks. The total amount of the reserves Norges Bank provides to banks must be kept on deposit with Norges Bank, in the

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[2] For a detailed discussion of Norges Bank's balance sheet items, see "Norges Bank's balance sheet and earnings", Norges Bank *Staff Memo* 9/2013, by Ellen Aamodt and Marie Norum Lerbak. The term central bank reserves is also discussed in "Om pengemengden" [On the money supply], Norges Bank *Staff Memo* 14/2013 by Marie Norum Lerbak, especially in relation to other money supply aggregates.

[3] Except for cases where reverse repurchase agreements for government securities have been used (see Section 2.2), there have been no securities denominated in NOK on Norges Bank's balance sheet since 2004.

respective banks' sight deposit accounts. These reserves, banks' sight deposits, are the only accepted means of interbank payment, and banks must have reserves to settle interbank payments.[4] Reserves are moved around between banks' accounts with the central bank in a closed system. When a bank transfers funds to another bank, settlement takes place by adjusting the two banks' sight deposit accounts at Norges Bank. Interbank transfers do not affect the total quantity of reserves in the banking system, only their distribution among banks.[5]

Reserves in the banking system are determined by two factors: autonomous factors and central bank market operations. Autonomous factors are those that are determined by parties other than the central bank. It is autonomous factors that determine structural liquidity. There are four main subcategories of autonomous factors: notes and coins, government borrowing, the government's day-to-day transactions and Norges Bank's purchases of foreign exchange for the Government Pension Fund Global (GPFG) on behalf of the government.

Like banks, the government also has an account with Norges Bank. All of the government's payments are made through private banks, but each day when the banking system closes, all payments are netted, and the government's funds are returned to the main account with Norges Bank. When private agents pay taxes and excise duties to the government, reserves are transferred from banks' sight deposits to the government account with Norges Bank. This reduces the quantity of reserves in the banking system. Conversely, when the government transfers funds to private agents (wages, benefits and other transfers), and when government securities are redeemed at maturity, reserves are transferred from the government's account with the central bank to banks' accounts at the central bank. This increases the reserves in the banking system.

The quantity of notes and coins in circulation is determined by public demand for cash. When public demand for notes and coins increases, banks purchase cash from the central bank by drawing on their sight deposits with Norges Bank and sell it on to the public. This reduces the quantity of reserves in the banking system.

Given the level of structural liquidity, Norges Bank must supply or withdraw reserves from the banking system to maintain total reserves at the desired level. Norges Bank uses market operations to manage bank reserves in the banking system using fixed-rate loans (F-loans) and fixed-rate deposits (F-deposits). The maturities of F-loans and F-deposits normally range between one day and two to three weeks. Norges Bank's F-loans to banks appear on the central bank's assets side, while F-deposits appear on the equity and liabilities side.[6] Total liquidity in the banking system is the sum of structural liquidity and central bank market operations. Norges Bank has a target for the level of total liquidity consistent with its strategy for the implementation of monetary policy.

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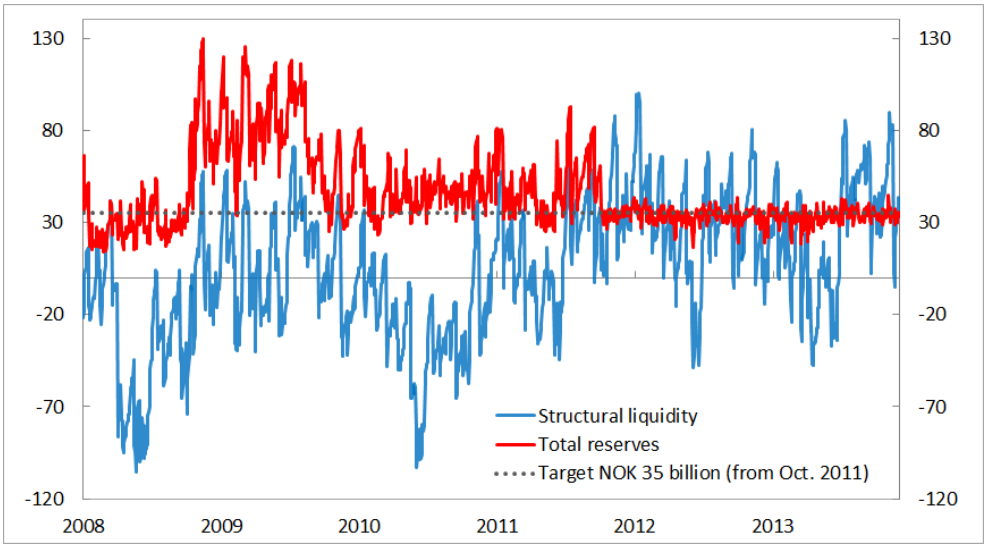
[4] In principle, banks can also settle interbank transactions in cash, but in practice, all settlement takes place using reserves. For banks with settlement via a settlement bank, transactions are executed using credit extended by the settlement bank.

[5] See "Misunderstood central bank reserves", Norges Bank *Economic Commentaries* 1/2012 by Tom Bernhardsen and Arne Kloster for a detailed discussion of this issue.

[6] The assets side also includes Norges Bank's foreign exchange reserves. The GPFG appears on both the assets side (foreign exchange investments) and liabilities side (the NOK value of the GPFG, which is owned by the government).

Chart 2 shows structural and total liquidity since 2008. Fluctuations in structural liquidity are discussed below. Total liquidity varies considerably, showing an upward trend until end-2011. Total liquidity has since remained stable at around NOK 35 billion. This is the result of changes in Norges Bank's liquidity management system in autumn 2011. Prior to this, Norges Bank's system for managing bank reserves was a so-called floor system, whereby interest was paid on all bank reserves at the central bank at the key policy rate. At that time, Norges Bank did not have a specific target for the level of the reserves. Since October 2011, Norges Bank has aimed to maintain total reserves in the banking system at NOK 35 billion. Under this system, a defined quantity of bank reserves (a quota) bears interest at the key rate. Deposits in excess of this quota bear a lower rate, the so-called reserve rate.[7]

Chart 2. Developments in structural and total liquidity. January 2008 – November 2013.



In order to manage the total quantity of reserves in the banking system, Norges Bank prepares a structural liquidity forecast. Updates are published every Monday and Thursday on the Bank's website.[8] The liquidity forecast provides a more informed basis for banks participating in Norges Bank's market operations to evaluate forthcoming F-loan and F-deposit auctions, including volume and term to maturity. These forecasts can therefore assist banks in their liquidity management. As mentioned above, structural liquidity is determined primarily by changes in notes and coins, government borrowing, the government's day-to-day transactions and Norges Bank's foreign exchange purchases for the GPFG. In addition, structural liquidity will be affected if Norges Bank buys or sells foreign exchange or securities in the market, as well as

[7] Different liquidity management systems, including the "floor" and "corridor" systems, are extensive topics and will not be discussed in this commentary. For a detailed discussion, see "Liquidity management system: Floor or corridor?", Norges Bank *Staff Memo* 4/2010 by Tom Bernhardsen and Arne Kloster og "Systemer for likviditetsstyring: Oppbygging og egenskaper" [Liquidity management systems: structure and characteristics], Norges Bank *Staff Memo* 5/2011 by Olav Syrstad. The background to the changes to the liquidity management system and a description of the present system are discussed on the Norges Bank website (see https://www.norges-bank.no/no/prisstabilitet/likviditetsstyring/likviditetsstyringssystemet/ and http://www.norges-bank.no/no/prisstabilitet/likviditetsstyring/likviditetsstyringssystemet/styring-av-bankenes-reserver-systemet-i-norge/)

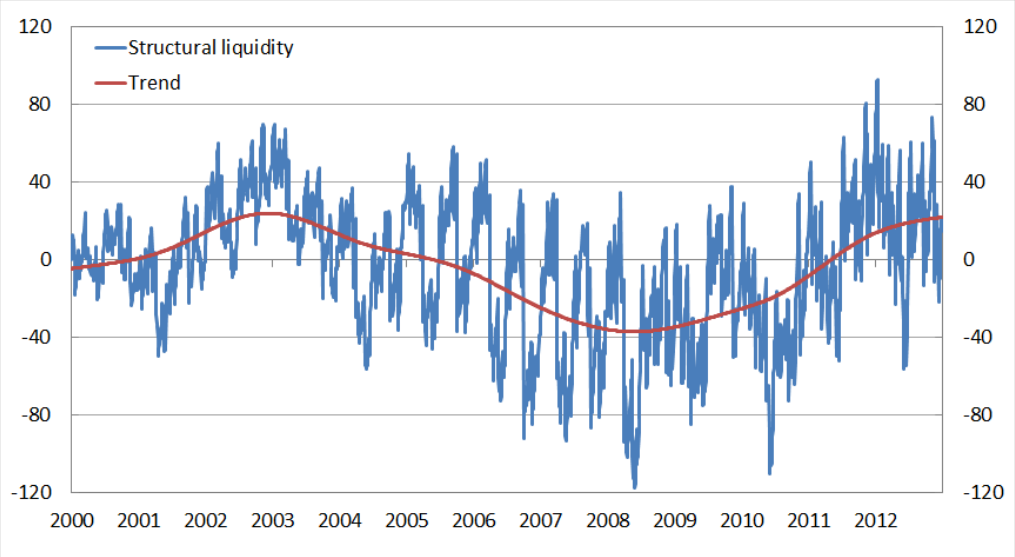
[8] The forecasts are available here: http://www.norges-bank.no/no/prisstabilitet/likviditetsstyring/statistikk-og-prognoser/. For more information on how liquidity forecasts are compiled, see http://www.norges-bank.no/no/prisstabilitet/likviditetsstyring/likviditetsprognoser/

through repurchase and reverse repurchase agreements in the government securities market. In the following, we discuss in more detail how the various components influence structural liquidity.

2. Transactions between the government and the banking system

The largest fluctuations in structural liquidity are generated by transactions between the government and the banking system. Payments from the banking system to the government reduce structural liquidity, while payments from the government to the banking system increase structural liquidity. For example, in 2012, the government received approximately NOK 235 billion in income and wealth taxes, NOK 230 billion in oil taxes from oil companies and NOK 220 billion in VAT. In the same year, the government paid out close to NOK 150 billion in transfers to local governments, over NOK 100 billion to regional health authorities and approximately NOK 350 billion through National Insurance. Even though these payments are divided into a number of transactions through the year, transactions associated with a single payment on a single day can be up to NOK 90 billion. In such cases, structural liquidity, all else being equal, will change by a corresponding amount. Chart 3 shows developments in structural liquidity from January 2000 until December 2012 (including trend).

Chart 3: Structural liquidity. 2000-2012. Daily data. In billions of NOK.[9]

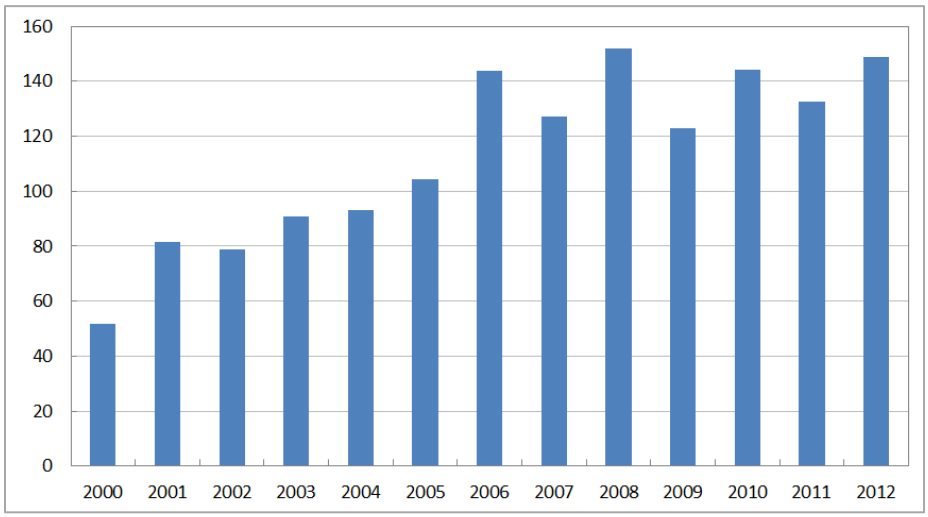


The majority of transactions between the government and banking system follow a fixed calendar. As a result, structural liquidity follows a regular yearly pattern. The pattern can be seen in Chart 3, where the blue line behaves in a fairly similar fashion from year to year. Changes in the pattern of one or more of the flows between the government and the banking system affect the pattern of structural liquidity. For example, in 2008, the number of oil companies' oil tax payments increased from two to six per year. The changes in structural liquidity as a result of oil tax payments were therefore more frequent and smaller in size.

Chart 4 shows the difference between the lowest and highest levels of structural liquidity each year in the period 2000-2012 and provides an idea of how the size of fluctuations in structural liquidity has changed over time.

[9] The trend line was estimated with an HP filter, where λ=1 000 000 000.

Chart 4: Difference between the highest and lowest levels of structural liquidity. 2000-2012. In billions of NOK.



The difference between the highest and lowest levels of structural liquidity has shown a rising trend since 2000. The primary reason is the year-to-year increase, in nominal terms, in the fiscal budget. Thus, the flows between the government and the banking system, in nominal terms, also increase, resulting in greater fluctuations in structural liquidity.

All government transactions that influence structural liquidity take place via the government's account with Norges Bank. The amount on deposit in the government's account with Norges Bank is usually referred to as "the government's cash holdings". In order to have a buffer large enough to cover current and unforeseen payment obligations, the government's policy is that its cash holdings should normally not fall below NOK 50 billion. Cash holdings fluctuate considerably in the course of a year. For example, in 2011, it varied between NOK 75 billion and NOK 225 billion and between NOK 55 billion and NOK 250 billion in 2012. As is the case for structural liquidity, nominal fluctuations in the government's account will increase in pace with the size of the fiscal budget.

The following sections focus on other transactions between the government and the banking system that influence structural liquidity.

2.1 The government's borrowing in the market

The government borrows by issuing government securities (Treasury bills and government bonds).[10] The sale of government securities in the primary market results in a reduction of structural liquidity.[11] Likewise, when the security matures, the government must repay the amount borrowed. This results in an increase in structural liquidity. If the level of government

[10] Norges Bank is responsible for all operational tasks relating to government securities. However, all transactions, aside from settlement of reverse repurchase agreements, take place on the government balance sheet. For more information on government debt management, see http://www.norges-bank.no/en/price-stability/government-debt/

[11] This is because the bank buying the security pays for it with central bank reserves. This reduces banks' deposits with Norges Bank, and increases the government's deposits by the same amount. After the bank has received the security, it is free to resell it to another agent in the secondary market. The result of such transactions is that government securities and reserves are moved around internally in the banking system, but do not affect the level of structural liquidity.

bonds outstanding is kept constant over time, the long-term impact of government securities on structural liquidity will be neutral.[12] The government has two borrowing programmes, short-term borrowing in the form of Treasury bills and long-term borrowing in the form of bonds.

Short-term borrowing: Treasury bills

Treasury bills are zero-coupon instruments with a maturity of less than one year. New Treasury bills are issued on fixed dates, called International Money Market (IMM) dates[13], and they mature on the corresponding IMM date the following year. During the "life" of the Treasury bill, the volume can be increased.[14] Government borrowing in the form of Treasury bills is aimed at ensuring that the government has sufficient liquidity ("cash") in its account with Norges Bank at all times to meet its payment obligations (cf. the discussion of the government's cash holdings at Norges Bank above). As mentioned, the government's policy is to have a minimum of NOK 50 million available in its account with Norges Bank at all times. In principle, given the minimum level of cash holdings, the volume of Treasury bills to be issued should therefore be equal to the volume of maturing Treasury bills. The effect of government borrowing in the form of Treasury bills would then be neutral. In practice, Treasury bill issues must be increased ahead of prolonged periods of net disbursements by the government. Periods of increased Treasury bill issuance will be followed by reduced Treasury bill issuance. These cycles do not necessarily follow the calendar year. For that reason, year-by-year comparison of issue volume with redemption volume may be problematic. For example, in 2012, a total of NOK 62 billion in Treasury bills was issued, while redemptions at maturity amounted to NOK 45 billion. The increase of NOK 17 billion in net borrowing was to ensure that the minimum cash holding would be maintained during a period characterised by substantial outflows from the government's account.

In 2008, the swap arrangement was established to ensure banks' access to long-term funding. The government entered into agreements with banks to exchange Treasury bills for covered bonds. The arrangement eventually totalled NOK 230 billion and entailed a corresponding increase in the volume of Treasury bills outstanding. However, Treasury bills issued in conjunction with the swap arrangement did not influence structural liquidity, since they were swapped for securities and not for central bank reserves.[15]

Long-term borrowing: government bonds

The government's long-term borrowing funds government lending to state banks[16], in the form of government bond issues. Government bonds have an original term to maturity of more than one year and entitle the holder to a fixed, annual coupon rate. In recent years, the government

[12] The government's interest expense on government debt reduces the government's account and increases structural liquidity. All else being equal, a positive net interest expense for the government will result in higher structural liquidity.
[13] International standard settlement dates: the third Wednesday of March, June, September and December each year.
[14] This means that a Treasury bill issued on the first IMM date (mid-March) has a 12-month maturity, falling due for repayment in mid-March the following year. This bill will thus have a 9-month maturity in mid-June. If the bill issue is expanded in June, this is in reality an issue of bills with a 9-month maturity.
[15] For further details regarding the swap arrangement, see http://www.norges-bank.no/en/price-stability/swap-arrangement/
[16] State banks include the Norwegian State Education Loan Fund, the Norwegian State Housing Bank and Export Credit Norway.

has issued a new 11-year bond every other year in even-numbered years (2000, 2002 etc.), with maturity in odd-numbered years (2001, 2003 etc.). Other long-term borrowing has been in the form of an expansion of existing bond issues. Thus, at any given time, the government has had five to six bonds outstanding in the market, and the impact of bond market borrowing on structural liquidity follows a marked two-year pattern (see Chart 2).

In years when there is increased net borrowing from the bond market (both new issues and expansion of existing issues), the level of structural liquidity declines. In 2012, government bonds totalling NOK 60 billion were issued, spread over a number dates through the year. This reduced structural liquidity. In years when government bonds mature, substantial reserves are added to the banking system. For example, government bond NST 469 with a nominal value of NOK 40 billion was redeemed at maturity in May 2011. Existing bond issues are also increased in years when one of the bonds matures. In 2011, existing bond issues were expanded by a total of NOK 20 billion, spread over six auctions. In 2011 overall, government bonds increased structural liquidity by NOK 20 billion.

Chart 5: Cumulative effect of government securities on liquidity and cumulative government lending to state banks. 2000-2012. Daily data. In billions of NOK.

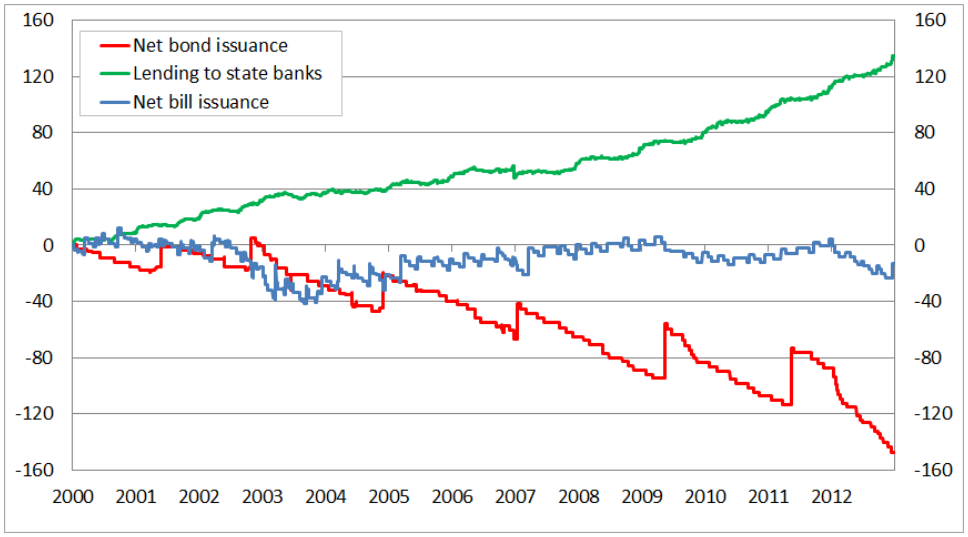


Chart 5 shows the cumulative effect of Treasury bills, government bonds and government lending to state banks on structural liquidity in the period 2000-2012.[17] When the cumulative net effect on structural liquidity of the government's Treasury bill issuance (blue line) is negative, the value of issues exceeds that of redemptions at maturity, which entails lower structural liquidity. If new bill issuance were exactly equal to redemptions at maturity, the blue line would always be at zero. That the blue line fluctuates close to zero illustrates the fact that issue and redemption dates do not necessarily coincide. This is because the government's desired level of cash holdings may vary (see discussion above).

The red line in Chart 5 shows the cumulative net effect on structural liquidity of the government's bond issuance. The "jumps" along the red line every other year represent government bond maturity dates (e.g. in 2009 and 2011). Each jump represents an increase in

[17] Interest expenses on borrowing are not included. Interest expenses on government debt, all else being equal, reduces the fiscal surplus. At the same time, the government receives interest income on lending to state banks etc., which, all else being equal, increases the fiscal surplus.

structural liquidity. In years without redemptions (such as 2010 and 2012), we see that bond issuance generally reduces structural liquidity. The red line shows a negative trend throughout the period. This means that the government's bond issuance has exceeded redemptions and that the stock of government bonds outstanding has increased over time.

Developments in the stock of government bonds outstanding must be viewed in the context of the green line, which shows the government's cumulative lending to state banks. When the government lends to state banks, reserves are transferred from the government's account with Norges Bank to these banks' accounts with the Bank. This increases structural liquidity. As mentioned above, the government's lending to state banks is financed by issues of government bonds. Over time, net lending to state banks will then be equal to net issuance of government bonds, in which case the level of structural liquidity over time remains unaffected. This is shown in Chart 5, where the absolute values of the red and green lines should be equal over time.[18]

2.2 Repurchase and reverse repurchase agreements

Banks that are primary dealers[19] of Norwegian government securities may enter into repurchase and reverse repurchase agreements with the government. Under a repurchase agreement, the government lends a bank government securities (bills or bonds) worth a certain amount for up to a week, in exchange for reserves (reserves are transferred from the bank's account to the government's account with Norges Bank), thereby reducing structural liquidity. When the agreement reaches maturity, the transaction is reversed and the reserves are returned from the government's account to the bank's account. Repurchase agreements result in temporary reductions in structural liquidity, but do not affect the level over time.

Under reverse repurchase agreements, banks can lend government securities to Norges Bank in exchange for reserves. The transactions are the same as for a repurchase agreement, only in reverse order. They give rise to temporary increases in structural liquidity, but do not affect the level over time. In addition to the temporary liquidity effects of repurchase and reverse repurchase agreements, there are also limits on the amounts that may be lent under agreements of this type. This means that impacts on structural liquidity from securities lending agreements are also minimal.

2.3 Norges Bank's foreign exchange purchases for the GPFG

The Norwegian government receives substantial revenues from petroleum activities. These revenues are in both foreign currency and Norwegian kroner. Some of these revenues are used each year to cover the fiscal deficit, with the remainder transferred to the GPFG. Norges Bank performs the task of purchasing foreign exchange for the GPFG for the Ministry of Finance. Since the assets in the GPFG are invested exclusively in foreign currency, Norges Bank must also purchase foreign exchange in the amount necessary to cover transfers to the GPFG.[20]

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[18] At end-2012, the government had borrowed more than had been lent to state banks. The reason was that it needed to finance a portion of the redemptions of bonds maturing in 2013.

[19] For further information on primary dealers and primary dealer agreements, see http://www.norges-bank.no/en/about/news-archive/2013/primary-dealer-agreements-2014/

[20] Portions of this section and the one following draw on "The petroleum fund mechanism and Norges Bank's foreign exchange purchases for the GPFG", Norges Bank *Economic Commentaries* 14/2012 by Ellen Aamodt, which provides a more detailed discussion of Norges Bank's foreign exchange purchases and the petroleum fund mechanism.

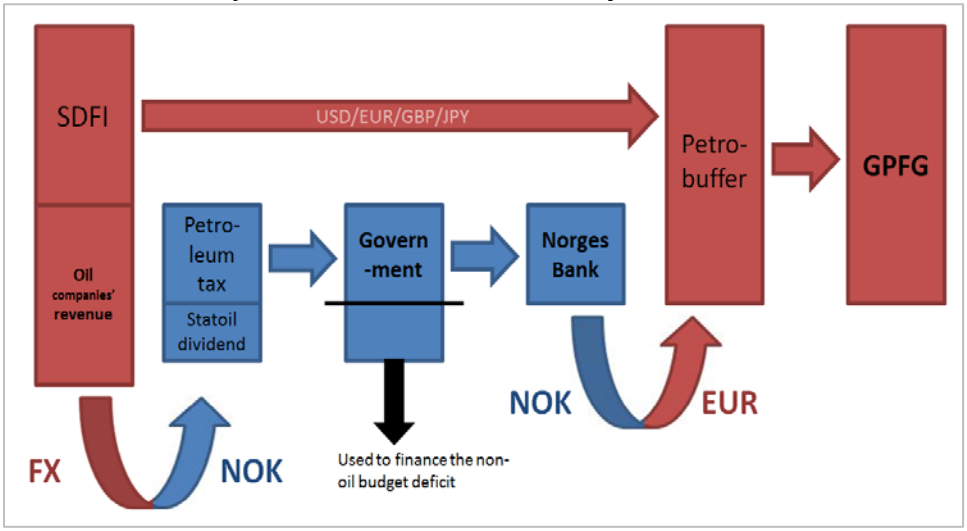
Government revenues from the petroleum sector, also called the government's net cash flow from petroleum activities, primarily comprise revenues from the State's Direct Financial Interest in the petroleum sector (SDFI), oil taxes and dividend from Statoil. A considerable portion of transfers to the GPFG comes from revenues from the sale of government-owned petroleum (SDFI). Virtually all of the SDFI's revenues are in foreign currency, and since the SDFI does not pay taxes, the revenues are transferred directly to the GPFG in foreign currency (via the petroleum buffer portfolio at Norges Bank).[21] The remaining transfers take place once oil companies have converted their foreign currency revenues into NOK and paid tax to the government in NOK.[22] Norges Bank then purchases foreign exchange in the market on behalf of the government and transfers this to the GPFG. In somewhat simplified terms, Norges Bank purchases foreign exchange using the portion of the government's NOK-denominated petroleum revenues that is not spent over the fiscal budget.

We can summarise the relationships between the variables as follows:

The government's net cash flow from petroleum activities = Oil taxes + Revenues from the SDFI + Dividend from Statoil = Structural non-oil budget deficit + Transfers to GPFG

The government's net cash flow from petroleum activities is used to cover a structural non-oil budget deficit and for transfers to the GPFG. The petroleum fund mechanism, Norges Bank's foreign exchange purchases and transfers to the GPFG are illustrated in Chart 6.

*Chart 6. Petroleum fund mechanism: Government petroleum revenues and transfers to the GPFG. **



**Red boxes and arrows indicate cash flows in foreign currency. Blue boxes and arrows indicate cash flows in NOK.*

Over time, the petroleum fund mechanism as described above has a neutral effect on banking system liquidity (on both structural and total liquidity). Revenues from the SDFI are transferred

[21] Revenues from the SDFI are transferred every day via a foreign exchange portfolio in Norges Bank called the "petroleum buffer", where they accumulate prior to final transfer to the GPFG once a month.

[22] Amounts payable by oil and gas companies are transferred from these companies' accounts in Norwegian banks to the government's account with Norges Bank. Oil tax is payable six times a year: 1 February, 1 April, 1 June, 1 August, 1 October and 1 December. Dividend payment from Statoil is a direct transfer in NOK from Statoil's account in one of the Norwegian banks to the government account with Norges Bank.

directly to the government in foreign currency and do not influence reserves in the banking system, either in the short or long term. However, payment of oil taxes in NOK, Norges Bank's foreign exchange purchases and the structural non-oil budget deficit have short-term effects, as the transactions related to them do not occur simultaneously. Three factors are central:

1. Payment of oil tax by oil and gas companies and the government's dividend from Statoil (paid in NOK) entail transfers of reserves from banks' sight deposit accounts with Norges Bank to the government's account with the Bank. This represents a withdrawal of reserves from the banking system, resulting in isolation in a decline in structural liquidity.

Over time, the same quantity of reserves returns to the banking system via two channels:

2. A portion of the reserves returns to the banking system when Norges Bank purchases foreign exchange for the GPFG. When Norges Bank purchases foreign exchange, the central bank pays by crediting banks' sight deposit accounts with Norges Bank.[23]
3. The remaining reserves are added to the banking system when the government spends petroleum revenues over the fiscal budget. When the government pays for goods and services, or transfers funds to various sectors of the economy, the government's deposits with Norges Bank are reduced, while banks' deposits increase by the same amount.

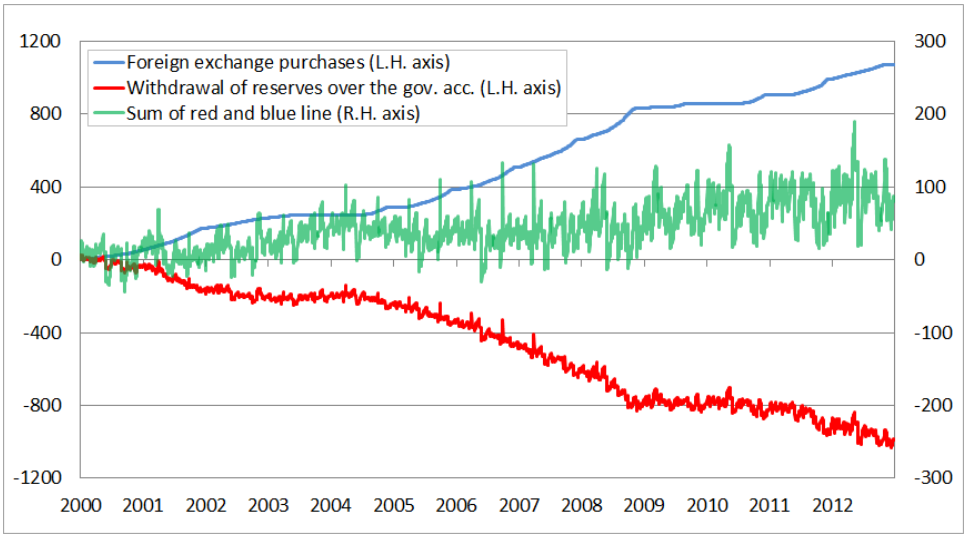
Overall, the liquidity effect of Norges Bank's foreign exchange purchases plus the liquidity effect of the structural non-oil budget deficit equals the liquidity effect of oil and gas companies' payments of oil tax and dividend from Statoil. Thus, the net effect on banking system liquidity is neutral.[24]

3. The increase in structural liquidity since 2000

As long as the government has deposits with Norges Bank, structural liquidity in isolation should be negative. Nevertheless, from time to time, structural liquidity in Norway is positive (see Chart 2). This section will offer an explanation of why this is so. Key variables are the withdrawal of reserves over the government's account and Norges Bank's foreign exchange purchases for the SPU.

[23] When Norges Bank subsequently transfers capital to the GPFG, the government's account is debited for the foreign exchange purchases to cover the transfer.
[24] In the example above, we assumed that the structural non-oil budget deficit was less than the oil tax paid in NOK by oil companies. If the structural non-oil budget deficit were greater than the oil tax paid in NOK by oil companies, this revenue alone would not be sufficient to cover the deficit. Obtaining enough NOK to cover the deficit would then have implied selling foreign exchange from SDFI revenues. Selling foreign exchange and purchasing NOK would in isolation reduce banking system liquidity. Even so, the overall effect on liquidity would be still be neutral, since the negative effect on liquidity from oil tax payments plus the negative effect from Norges Bank's purchases of NOK would be matched by the positive effect on liquidity of the structural non-oil budget deficit.

Chart 7. Cumulative withdrawal of reserves over the government's account and Norges Bank's cumulative foreign exchange purchases for the GPFG. Daily data. In billions of NOK. 2000-2012.



The red line in Chart 7 shows cumulative transactions in NOK between the government's account and the banking system since January 2000. All transactions over the government's account are included, including tax receipts and payment of pensions, benefits and transfers, redemption of government securities, government borrowing, government lending to state banks, etc. Tax payments to the government reduce structural liquidity, and the red line declines. Government spending over the fiscal budget increases structural liquidity, and the red line rises.

The red line shows a falling negative trend, which means that the government's transactions with banks have had a persistent draining effect on reserves. The reason is the government's current fiscal surplus (before transfers to the GPFG).[25] In principle, Norges Bank should exchange an identical amount of NOK for foreign exchange, in which case Norges Bank's addition of reserves via foreign exchange purchases will exactly match the draining effect over the government's account. In Chart 7, the blue line shows Norges Bank's cumulative foreign exchange purchases since January 2000, while the green line shows the cumulative difference between the red and blue lines. When the green line is positive, it means that in some periods, Norges Bank has purchased more foreign exchange for the GPFG than later proved to be actual transfers, which applies in particular to 2002 and 2009.[26] Norges Bank's purchases on two occasions of more foreign exchange than warranted by transfers to the GPFG must be viewed in the context of the uncertainty regarding transfers in the periods concerned.

Norges Bank's foreign exchange purchases are estimated and decided month by month throughout the calendar year, with the primary objective that the following equation will balance at the end of the year:

[25] As discussed above, issuance and redemption of government securities only have a temporary influence on structural liquidity and are liquidity-neutral over time. They therefore do not affect the trend in the red line.

[26] Norges Bank's purchases of foreign exchange in excess of amounts warranted by transfers to the GPGG were previously discussed in "Likviditetsstyringen i Norge og utviklingen i bankenes likviditet" [Liquidity management in Norway and developments in bank liquidity], Norges Bank *Staff Memo* 10/2010 by Erna Hoff. Hoff provides a detailed overview of the components that determined structural liquidity in the years 2000-2009.

Norges Bank's foreign exchange purchases = Transfers to the GPFG - SDFI revenues in foreign currency

To avoid unnecessary fluctuations in the krone exchange rate, Norges Bank prefers to spread foreign exchange purchases as evenly as possible over the year. The Bank therefore estimates how much foreign exchange it needs to purchase on the basis of a number of assumptions regarding the government's cash flow from petroleum activities and the structural non-oil budget deficit, and the difference between the two constitutes the transfer to the GPFG.

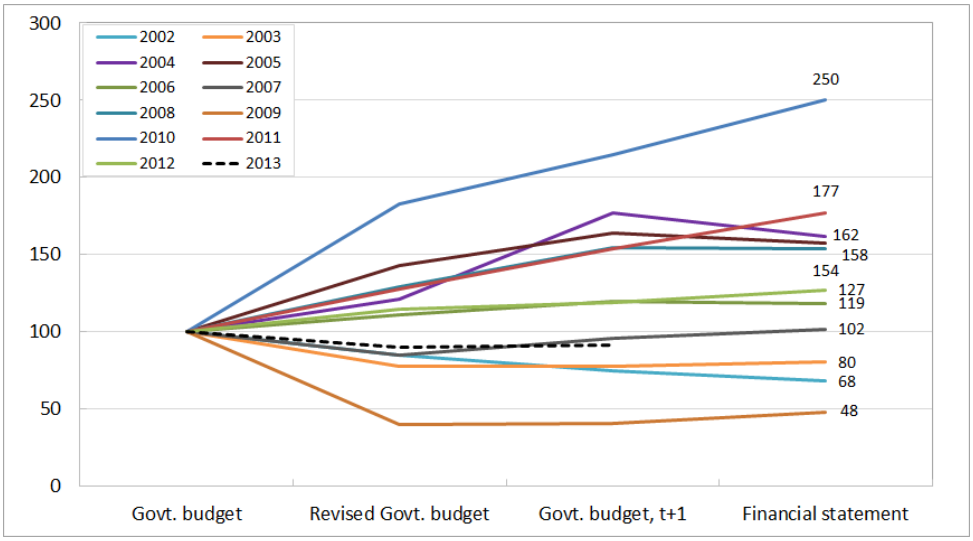
In principle, Norges Bank's foreign exchange purchases are the difference between transfers to the GPFG and revenues from the SDFI. In practice, the calculation is somewhat more complicated, since it involves several steps and many parties. Each month, the Ministry of Finance notifies Norges Bank of the amount of the transfer in NOK to the GPFG for the following month, while Petoro provides an estimate of the following month's foreign currency revenues from the SDFI. Norges Bank then takes stock (estimate and desired change) of the petroleum buffer portfolio, for both the current and the following month. Norges Bank's foreign exchange purchases the following month are then determined by

Norges Bank's foreign exchange purchases = Transfers to GPFG - SDFI revenues in foreign currency + [petroleum buffer balance at end of month – petroleum buffer balance at beginning of month]

Once the level of foreign exchanges purchases for the following month has been determined, the amount is distributed equally among all trading days the following month.

Ministry of Finance estimates for transfers to the GPFG at the beginning of the year are normally based on the fiscal budget drawn up the previous autumn. Through the year, actual transfers may differ from the estimate, depending on oil and gas prices, petroleum production and the economic situation. Chart 8 shows developments in Ministry of Finance estimates of transfers relative to the original fiscal budget estimate for each year from 2002 to 2013. For each year, the expected estimate at the beginning of the year for the following 12 months is normalised to 100. In several of the years, transfers to the GPFG were revised up substantially compared with estimates at the beginning of the year. In other words, each year, there is considerable uncertainty regarding the final amount of the transfers to the GPFG.

Chart 8. Developments in Ministry of Finance estimates of annual transfers to the GPFG. 2002-2013, normalised, January = 100.[27]



The result has been that in some years, Norges Bank purchased more foreign exchange than was necessary to cover transfers to the GPFG. In 2002 and 2009, transfers to the GPFG were substantially revised down after the Bank had already purchased considerable amounts of foreign exchange. Rather than "storing" the excess foreign exchange in the petroleum buffer to cover subsequent years' foreign exchange purchases (which all else being equal would have reduced the need for foreign exchange purchases at a later date), Norges Bank decided to transfer foreign exchange worth NOK 40 billion and NOK 20 billion, respectively, to the Bank's foreign exchange reserves (the money market portfolio and the long-term portfolio). This has resulted in a "permanent" increase in structural liquidity totalling NOK 60 billion. This transfer can be seen in the green line in Chart 7, the difference between withdrawal of reserves over the government's account and the supply of reserves through Norges Bank's foreign exchange purchases, and corresponds approximately to the NOK 60 billion purchased in excess of the amount warranted by transfers to the GPFG.

4. Structural liquidity forecast for 2014

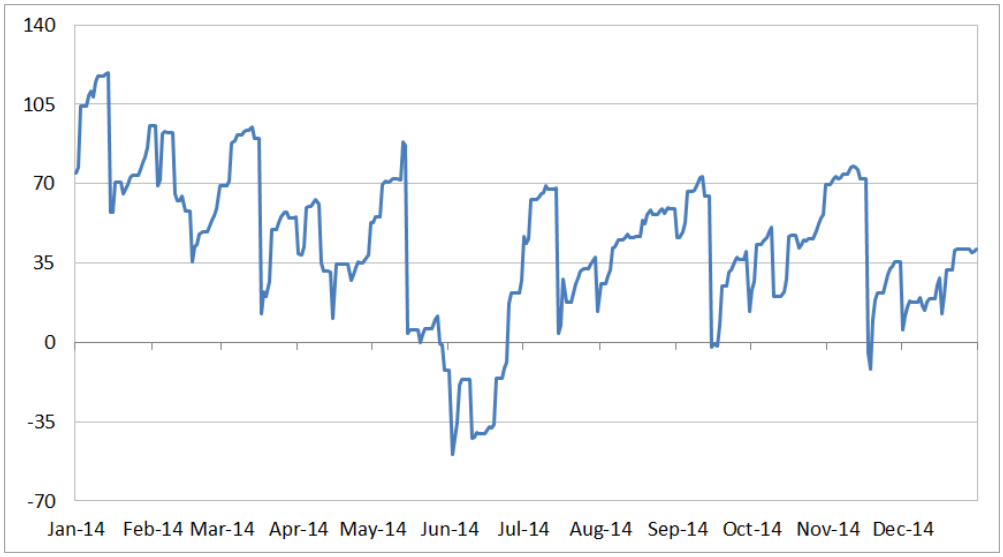
Chart 9 shows Norges Bank's structural liquidity forecast for 2014.[28] The forecast is based on the pattern of transactions between the government and the banking system in previous years, adjusted for assumptions regarding the government's cash flows as given in the fiscal budget for 2014. Planned Treasury bill and government bond issuance has also been incorporated. There is considerable uncertainty surrounding the forecast. The economic situation and oil and gas

[27] The chart shows the percentage increase in the estimates of transfers to the GPFG according to the original fiscal budget, the revised budget, the following year's fiscal budget and the financial statements. For example, in 2010, transfers in the revised budget were 50 percent higher than estimated in the fiscal budget. Transfers reported in the financial statements were 150 percent higher than estimated in the 2010 fiscal budget.

[28] The structural liquidity forecast is updated with new information twice a week and is published on Norges Bank's website (see http://www.norges-bank.no/en/price-stability/liquidity-management/statistics-and-forecasts/). For more information on how Norges Bank draws up structural liquidity forecasts, see http://www.norges-bank.no/en/price-stability/liquidity-management/liquidity-forecast/ and http://www.norges-bank.no/pages/86136/Hvordan_lage_prognoser_for_likviditeten.pdf (in Norwegian).

prices are examples of uncertainty factors that play have an important influence on actual developments in structural liquidity.

Chart 9. Structural liquidity forecast for 2014. Daily data. In billions of NOK.



As the chart shows, the opening level of structural liquidity in 2014 is expected to be approximately NOK 70 billion. Structural liquidity will be relatively high at the beginning of the year, as a consequence of high structural liquidity in 2013 following the redemption at maturity of government bond NST 470 in May 2013. According to the auction calendar for government borrowing in 2014, the government plans to issue up to NOK 70 billion in bonds and up to NOK 70 billion in Treasury bills during the year. This will draw down reserves, reducing structural liquidity. No government bonds will reach maturity in 2014. This means that average structural liquidity will be lower in the second half of 2014 than in the first.

Chart 10 is an extrapolation of developments in structural liquidity from 2000 that includes the forecast for the remainder of 2013 and for 2014. Not surprisingly, we see that the main pattern for structural liquidity, which has characterised developments since 2000, repeats itself in 2014.

Chart 10. Structural liquidity. 2000-2013 incl. forecast for 2014.