

No. 3 | 2012

Economic commentaries

The petroleum fund mechanism and Norges Bank's foreign exchange purchases for the GPFG

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The Norwegian government receives substantial revenues from the petroleum sector. These revenues are in both foreign currency and Norwegian kroner. Some of the oil revenues are absorbed in the Norwegian economy by being used to cover the non-oil budget deficit. The remainder is transferred to the Government Pension Fund Global (GPFG). Because the GPFG is invested in its entirety in foreign currency, the government's NOK revenues for the GPFG must be exchanged for foreign currency. Norges Bank performs the task of purchasing foreign exchange for the GPFG for the Ministry of Finance. This commentary describes how the government's revenues from the petroleum sector are channelled to the GPFG, how portions of these revenues are phased into the Norwegian economy and how Norges Bank calculates the foreign exchange purchases for the GPFG. The commentary also shows the relationship between the petroleum fund mechanism and the NOK exchange rate, and the level of reserves in the Norwegian banking system.

What is the petroleum fund mechanism?

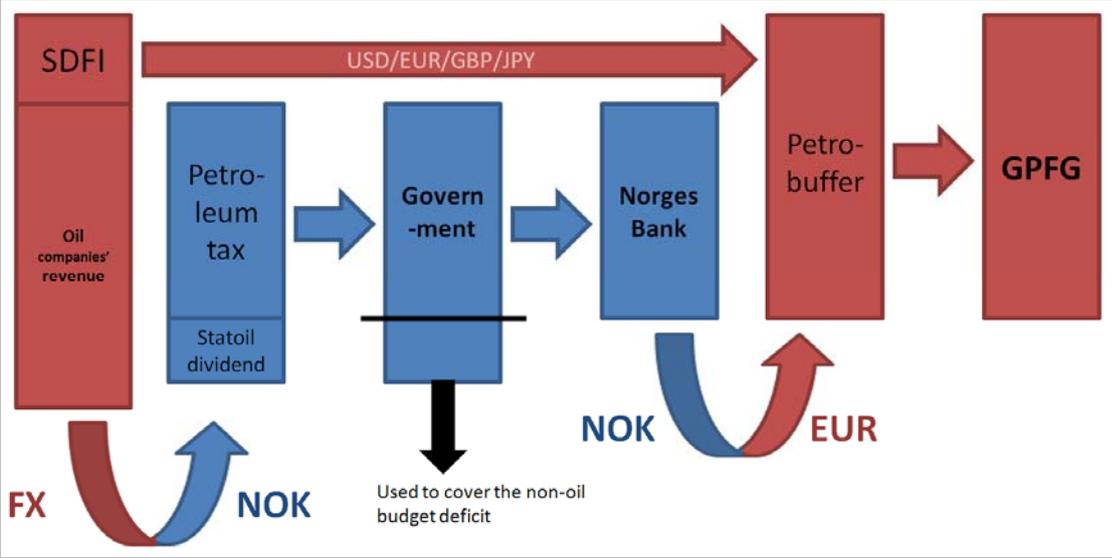
The Government Pension Fund Global (GPFG) was established in 1990, then under the name "Government Petroleum Fund". The first transfer to the fund took place in 1996, and as at February 2012, the fund had increased in size to over NOK 3.4 trillion. The Fund has been given the task of managing the government's revenues from petroleum activities and ensuring that petroleum revenues are phased into the Norwegian economy responsibly.

The government "spends" oil money by covering a planned annual national budget deficit, called the "structural non-oil budget deficit".¹ This means that the national budget is initially set up with a deficit with oil revenues excluded, and all of the government's revenues from the petroleum sector are transferred to the accounts of the GPFG. Subsequently, the deficit is financed by reversing funds from the GPFG. Fiscal policy is subject to a fiscal rule: Over time, the structural non-oil budget deficit shall approximately equal the expected real return on the GPFG, estimated to be 4 percent. The aim of the fiscal rule is for Norway over time not to spend the actual capital in the GPFG but only the return generated by the GPFG's investments.

The assets in the GPFG are invested exclusively in foreign currency. Portions of the transfers to the GPFG take place directly in foreign currency. The remainder of the transfers take place once oil companies have paid tax to the government in Norwegian kroner. Norges Bank then purchases foreign exchange on behalf of the government and transfers this to the GPFG. Norges Bank estimates the amount of foreign exchange to be purchased each month. This amount is then divided into daily purchases for that month.

¹ The Norwegian government (like every other government) has "ordinary" revenues and expenditures, besides revenues from petroleum activities. It is the difference between "ordinary" revenues and expenditures that are referred to as the structural non-oil budget deficit, because the government's petroleum revenues are not included on the revenue side. This deficit must be financed. Countries that have no other choice finance fiscal deficits by government borrowing in the market. Norway finances its deficit by drawing on the Fund.

Chart 1. The government's oil revenues and transfers to the GPFG.



Government revenues from the petroleum sector

Government revenues from petroleum activities, also called the government's net cash flow from petroleum activities, primarily comprise oil taxes, revenue from the sale of the government's own petroleum (the State's Direct Financial Interest, SDFI) and dividend from Statoil. All oil and gas producers on the Norwegian continental shelf, with the exception of Petoro which is a state-owned oil company, pay tax to the government on the oil and gas they produce and sell. In somewhat simplified terms, these companies have to pay a 78 percent marginal tax rate on all net oil income. There are also other taxes and duties. This results in substantial payments from oil and gas companies to the government every year.

Oil tax is payable in NOK. Oil and gas company revenues from petroleum sales are primarily in foreign currency. For that reason, oil and gas companies need to exchange a substantial share of their foreign currency revenues for NOK before paying oil tax. Oil tax is payable six times a year: 1 February, 1 April, 1 June, 1 August, 1 October and 1 December. On these dates, the amounts payable by oil and gas companies are transferred from these companies' accounts in Norwegian banks to the government's account with Norges Bank. The amounts vary depending on how much oil and gas companies earn on oil and gas sales, which depends in turn on oil and gas prices and production volumes. In 2011, the oil tax brought in an average per payment date of around NOK 35 billion.

Besides oil tax revenues, the government also earns revenues from the sale of oil and gas it owns. Through the SDFI the government has ownership interests in fields and production facilities on the Norwegian continental shelf, and thus rights to revenues from oil and gas sales from these fields. The SDFI is managed by Petoro, a state-owned company. The SDFI has virtually all its revenue in foreign currency, and because the SDFI does not pay tax, its revenues are transferred directly to the government in foreign currency and therefore do not need to be exchanged. 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.

In addition to revenue from oil taxes and direct sales of state-owned oil and gas, the government receives an annual dividend from Statoil, of which it owns approximately a two-thirds shareholding. Dividend payment takes place once a year and is a direct transfer in NOK from Statoil's account in one of the Norwegian banks to the government account with Norges Bank.

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, which comprises oil taxes, revenue from the SDFI and dividend from Statoil, is used to cover a structural non-oil budget deficit and for transfers to the GPFG.

Changes in oil and gas prices or changes in petroleum production affect the magnitude of the government's cash flow from petroleum activities. The structural non-oil budget deficit is determined by several other variables in addition. In the long term it is the return on the GPFG and the fiscal rule for petroleum revenue spending that determines the potential level of the structural non-oil budget deficit. In the short term, the business cycle is important. Changes in the government's general tax receipts and in the government's cyclically related expenditure (such as unemployment benefits) affect the size of the budget deficit and thus net transfers to the GPFG. When the Norwegian economy is performing well and tax receipts rise, the structural non-oil deficit will fall and net transfers to the GPFG increase. Conversely, when the Norwegian economy is in a downturn, and the fiscal deficit increases, this will normally result in a decline transfers to the GPFG.

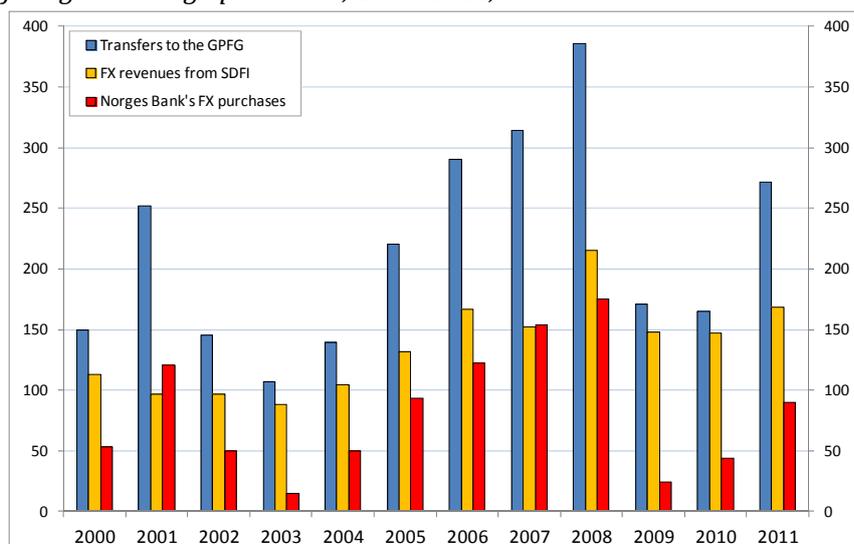
Calculation of the monthly and daily foreign exchanges purchases for the GPFG

The Department for Market Operations and Analysis at Norges Bank purchases foreign exchange for the GPFG on behalf of the Ministry of Finance. Thus, it is also Norges Bank's responsibility to calculate how much foreign exchange to buy or sell each month. The primary equation below determines monthly foreign exchange purchases:

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

Developments in transfers to the GPFG, revenues from the SDFI and Norges Bank's foreign exchange purchases are illustrated in Chart 2. Transfers to the GPFG increased markedly through the 2000s, due in part to higher government revenues because of economic growth and higher tax receipts and rising prices for oil and gas. In 2009, during the financial crisis, transfers to the GPFG fell sharply. The SDFI's revenues in foreign currency, which depend on the value of the petroleum production owned by the state, show the most stable developments.

Chart 2. Transfers to the GPFG, revenues in foreign currency from the SDFI and Norges Bank's foreign exchange purchases, 2000-2011, in NOK billions.

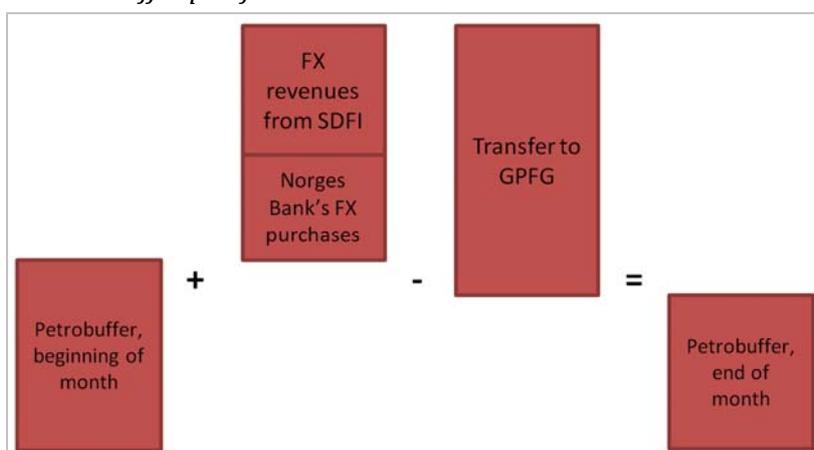


Source: Norges Bank.

As the equation above indicates, Norges Bank's foreign exchange purchases are, in principle, the difference between transfers to the GPFG and revenues from the SDFI, which is why the variation in foreign exchange purchases will normally reflect the variation in oil taxes, the structural non-oil budget deficit and the SDFI's revenues. In practice, foreign exchange purchases may also fluctuate with the size of the petroleum buffer portfolio in Norges Bank.

The task of the buffer portfolio is to reduce fluctuations in the oil tax, the structural non-oil budget deficit and the SDFI's revenues, to prevent excessive fluctuations in foreign exchange purchases and undesirable variations in the krone exchange rate. The buffer portfolio accumulates funds each month from Norges Bank's foreign exchange purchases from the GPFG and foreign currency revenue from the SDFI. On the last day of the month, the buffer portfolio is reduced by the amount that Ministry of Finance decides to transfer that month, which represents a final transfer to the investment portfolio of the GPFG.

Chart 3. Buffer portfolio accumulation.



Transfers to the GPFG take place each month from January through November. Funds are not normally transferred to the GPFG in December. At year-end, international equity and bond

markets are less liquid, making new investments by the GPFG less relevant. For that reason, Norges Bank does not purchase foreign exchange in December. However, inflows of foreign currency from the SDFI are continuous through the year.

Monthly estimates

In practice, the calculation of monthly foreign exchange purchases is somewhat complicated, since it includes several steps and 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, which is the monthly "instalment" on the annual net transfer to the GPFG. Petoro provides an estimate of the following month's revenue in foreign currency from the SDFI. Finally, Norges Bank estimates the total for the buffer portfolio for both the current and following month.

Norges Bank's foreign exchange purchases the following month are then determined by

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

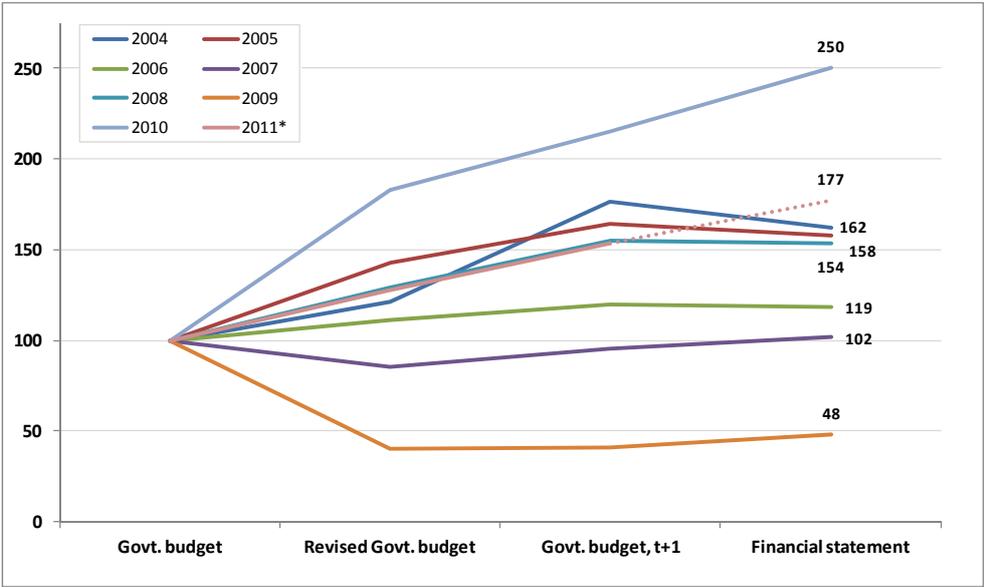
Once the level of foreign exchanges purchases for the following month has been determined, the amount is distributed equally among all trading days the following month.

To plan foreign exchange purchases, Norges Bank continually assesses the monthly estimates of transfers to the GPFG in view of annual and semi-annual forecasts of the SDFI's revenue in foreign currency. Because production and sale of petroleum fluctuate considerably, depending on seasonal variations and global economic conditions, oil and gas company revenues and the SDFI's revenues may vary somewhat from month to month.

Estimating transfers

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 4 shows developments in Ministry of Finance estimates of transfers relative to the original fiscal budget estimate for each year from 2004 to 2011. In several of the years, transfers to the GPFG were adjusted upward substantially compared with estimates at the beginning of the year.

Chart 4. Developments in Ministry of Finance estimates of annual transfers to the GPF, 2004-2011, normalised, Jan. = 100.²

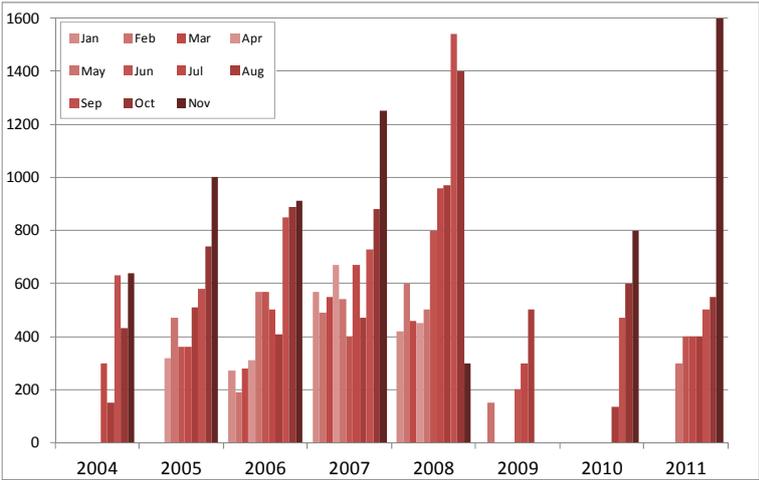


* Norges Bank's estimated financial statement

Sources: Ministry of Finance and Norges Bank.

To avoid unnecessary fluctuations in the krone exchange rate, Norges Bank prefers to allocate foreign exchange purchases as evenly as possible over the year. Norges Bank ensures predictability in foreign exchange purchases by publishing on the last day of each month the amount of foreign exchange to be purchased the following month. Chart 5, which illustrates Norges Bank's foreign exchange purchases each month between 2000 and 2011, shows that in some years, foreign exchange purchases varied substantially.

Chart 5. Norges Bank's foreign exchange purchases, monthly data, 2004-2011, in NOK millions/day.



Source: Norges Bank.

² The chart shows the percentage increase in estimated transfers to the GPF 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 national budget were 50 percent higher than estimated in the national budget. Transfers reported in the financial statements were 150 percent higher than estimated in the 2010 fiscal budget.

When the SDFI revenue forecast and the Ministry of Finance estimate of transfers to the GPFG vary little, Norges Bank will also be able to purchase foreign exchange at a more predictable and even level through the year. On the basis of assumptions regarding developments in the structural non-oil deficit, Norges Bank can consider purchasing more foreign exchange than the estimated monthly transfer would imply. Building up the petroleum buffer portfolio in this way is intended to avoid upward adjustments in foreign exchange purchases later in the year. Norges Bank can also purchase less foreign exchange than estimated transfers imply, if economic developments indicate that actual transfers will fall or if the buffer portfolio is large enough to cover future monthly transfers.

Liquidity effect of Norges Bank's foreign exchange purchases for the GPFG

Just as private market participants have accounts with private banks, banks have accounts with the central bank. Norwegian banks have an account with Norges Bank, known as sight deposit accounts, where banks daily deposit their surplus reserves and keep them with Norges Bank overnight. Banks' total deposits with Norges Bank are referred to as bank reserves, or bank liquidity. Banks need reserves to settle interbank transactions. When a bank transfers funds to another bank, the transfer is settled by adjusting the two banks' deposits with Norges Bank.³ Interbank transfers do not affect the total quantity of reserves in the banking system, only the way reserves are distributed among banks.^{4,5}

The government, too, has an account with Norges Bank. All government incoming and outgoing payments change the total quantity of reserves in the banking system. Incoming payments to the government reduce bank reserves because funds are transferred from banks' accounts with Norges Bank to the government's account with Norges Bank. Outgoing payments from the government increase bank reserves because funds are transferred from the government's account with Norges Bank to banks' accounts with Norges Bank.

Oil tax payments represent a substantial withdrawal of reserves from the banking system, as does Statoil's dividend payment to the government. However, revenues from the SDFI are transferred directly to the government in foreign currency and are therefore never exchanged for NOK. For that reason they do not affect reserves in the banking system either.

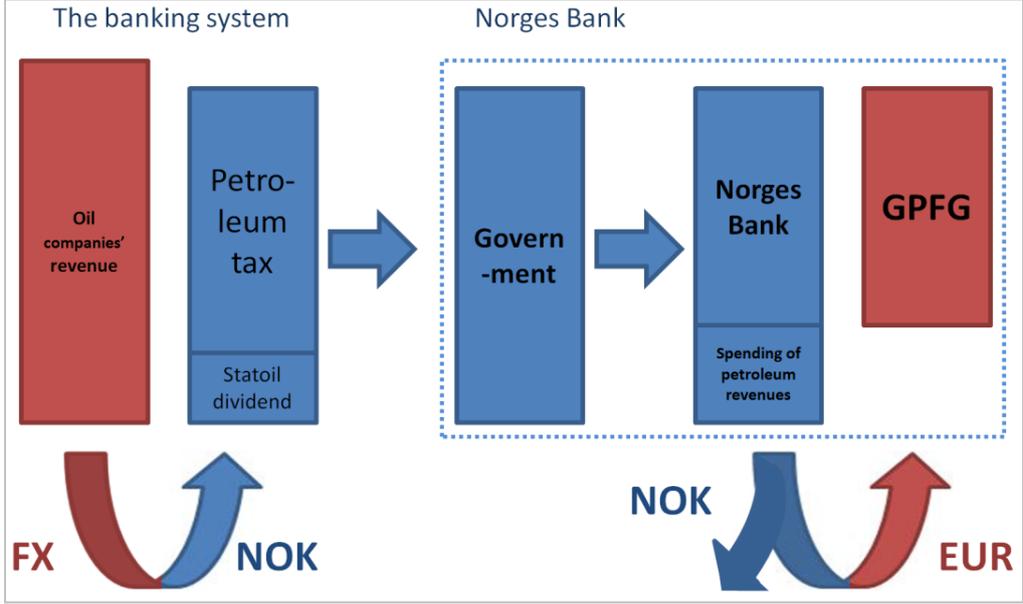
In the long term, reserves withdrawal from the banking system in connection with oil tax and dividend payments to the government is liquidity neutral. That is, over time, these reserves will be added to the banking system again. A portion of the reserves returns to the banking system when Norges Bank purchases foreign exchange for the GPFG (and sells NOK). The remaining reserves are added to the banking system when the government spends petroleum revenue over the central government budget.

³ For example, if bank A transfers NOK 1 million to bank B, bank A's deposits with Norges Bank are reduced by NOK 1 million, while bank B's deposits with Norges Bank increase by the same amount.

⁴ See Norges Bank's *Economic Commentaries 1/2012* by Tom Bernhardsen and Arne Kloster for a further analysis.

⁵ Norges Bank manages bank reserves with a view to keeping the shortest money market rates close to the key policy rate. The Bank does this through various forms of market operations, whereby the central bank acts to either increase or reduce reserves in the banking system. The system for managing bank reserves is described in detail on Norges Bank's website (www.norges-bank.no, under the tab Price stability/Liquidity management) and in "Systemer for likviditetsstyring: Oppbygging og egenskaper", Norges Bank *Staff Memo* 05/2011 by Olav Syrstad (in Norwegian only).

Chart 6. Illustration of the liquidity effect of Norges Bank's purchases of foreign exchange for the GPFG – amounts in NOK are of equal magnitude over time.



Estimates of how much foreign exchange Norges Bank needs to purchase for the GPFG are based on certain assumptions. Due to deviations from assumptions, Norges Bank purchased more foreign exchange in some years than what transfers to the GPFG would imply. This has resulted in a net addition of reserves from the central bank and is the reason that structural liquidity is at times positive.⁶ The corollary to the addition of these reserves to the banking system is increased foreign exchange reserves recognised in Norges Bank's balance sheet.⁷

A few examples in the appendix describe in detail how the petroleum mechanism affects liquidity in the banking system.

Effect on the krone exchange rate of the government's petroleum revenue spending

When oil and gas companies pay oil tax, they need to exchange their revenues in foreign currency to NOK. The government's dividend from Statoil is also paid in NOK.⁸ If the government's petroleum revenue were to be invested in the GPFG in its entirety, oil companies' exchange of foreign currency for NOK would be reversed completely, when Norges Bank re-exchanges NOK for foreign currency on behalf of the government. Over a period, the effect of the government's revenue from the petroleum sector on the krone exchange rate would be zero. Instead, historically, the government spends around 40 percent of annual petroleum revenues to cover the fiscal budget deficit. In simplified terms, the effect on the krone exchange rate from 40 percent of oil companies' exchange of foreign currency for NOK was not reversed when Norges Bank purchases foreign exchange for the GPFG. By itself, this results in appreciation pressure on the krone.

⁶ Structural liquidity refers to the level of bank reserves when excluding Norges Bank's liquidity operations.
⁷ See "Likviditetsstyringen i Norge og utviklingen i bankenes likviditet", Norges Bank *Staff Memo* 10/2010 by Erna Hoff for details (in Norwegian only).
⁸ Most of the SDFI's revenue is also in foreign currency. The SDFI transfers its revenues directly to the buffer portfolio in Norges Bank and then to the GPFG in foreign currency and therefore does not have to exchange them. For that reason, the krone exchange rate is not affected by revenues from the SDFI.

However, many factors affect the krone exchange rate over time⁹, including interest rate differentials against other countries, the oil price, various risk factors in the market and market participants' views concerning economic developments. The overall effect on the krone exchange rate may therefore vary over time. In addition, oil companies' demand for NOK and Norges Bank's foreign exchange purchases may have short-term effects in the NOK market through the year. All in all, the phasing-in of petroleum revenues over the central government budget is only one of numerous factors affecting the krone exchange rate.

⁹ See, for example, "En oversikt over Norges Banks analyser av kronekursen", Norges Bank *Staff Memo* 7/2010 by Flatner, Tornes and Østnor (in Norwegian only).

Appendix.

A pair of examples illustrates how the petroleum fund mechanism functions. The examples are directly related to Norges Bank's balance sheet, of which the table below is a simplified excerpt.

Table: Norges Bank balance sheet at 31 December 2010 (simplified). In NOK billions.

Assets		Liabilities and equity	
Net foreign exchange reserves and other foreign assets	316	Notes and coins in circulation	54
- of which the petroleum buffer portfolio	16	Deposits from the Treasury	137
Domestic assets:	68	Deposits from banks	80
- Lending to banks	2	Other liabilities	50
- Other assets		Equity	65
Total excluding the GPFG	386	Total excluding the GPFG	386
Holdings in the GPFG	3 074	Deposits in NOK account, GPFG	3 074
Total	3 460	Total	3 460

Example 1. The structural non-oil budget deficit (before transfers from the GPFG) is zero.

The simplest case is to imagine that the government's "traditional" revenues and expenditures are equal, resulting in a budget deficit of zero. Assume no foreign currency is transferred directly from the SDFI. Assume further that oil company taxes are NOK 600 (and that this amount derives from a tax base of USD 100 at an exchange rate of NOK 6 per USD 1). The following occurs:

- Oil companies sell USD 100 in the market and receive NOK 600.
- Oil companies pay NOK 600 into the government's account. Here NOK 600 is transferred from banks' accounts with Norges Bank to the government's account with Norges Bank. Reserves in the banking system are initially reduced by NOK 600.
- Norges Bank purchases NOK 600 worth of USD (i.e. USD 100), which is initially placed in the buffer portfolio. Reserves in the banking system increase again by NOK 600 because Norges Bank pays for the foreign exchange by transferring NOK to banks' accounts with Norges Bank. The total effect is that the quantity of reserves in the banking system remains unchanged.
- The foreign exchange is transferred from the buffer portfolio to the GPFG and invested in foreign assets.
- At the same time, NOK 600 is transferred from the government's ordinary account with Norges Bank to the krone account "the government's GPFG account with Norges Bank".
- There are also transfers from the SDFI, but in foreign currency. They have no effect on the quantity of reserves in the banking system or Norges Bank's purchases of foreign exchange.

Example 2. The assumptions are the same as in Example 1, but with the difference that the government has a budget deficit (before transfers from the GPFG) equal to NOK 200.

- Oil companies sell USD 100 in the market and receive NOK 600.
- Oil companies pay NOK 600 into the government's account. Here NOK 600 is transferred from banks' accounts with Norges Bank to the government's account with Norges Bank. Reserves in the banking system are reduced by NOK 600.

- The government finances a deficit of NOK 200 by drawing on the government's account with Norges Bank. Here NOK 200 is transferred from the government's account with Norges Bank to banks' accounts with Norges Bank, increasing reserves in the banking system by NOK 200.
- Norges Bank needs to purchase foreign exchange equal to the amount to be transferred to the GPFG. Total taxes paid are NOK 600. Of this amount, NOK 200 is used to finance the government budget deficit. Therefore, Norges Bank needs to purchase NOK 400 worth of foreign exchange for the GPFG.
- Norges Bank purchases NOK 400 worth of USD (i.e. USD 66.67, under our assumptions regarding the krone exchange rate), which is initially placed in the buffer. Reserves in the banking system thus increase by NOK 400, because Norges Bank pays for the foreign exchange by transferring NOK to banks' accounts with Norges Bank.
- The foreign exchange is transferred from the buffer portfolio to the GPFG and invested in foreign assets.
- At the same time, NOK 400 is transferred from the government's ordinary account with Norges Bank to the government's GPFG account with Norges Bank.
- The total effect is that the quantity of reserves in the banking system remains unchanged. Furthermore, the value of the GPFG has increased by USD 66.67, while the NOOK account "the government's GPFG account with Norges Bank" has increased by NOK 400.
- As in Example 1, there are also transfers from the SDFI, but they have no effect on the quantity of reserves in the banking system or Norges Bank's purchases of foreign exchange.