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Kathrine Lund and Kjetil Stiansen¹

Over time, the government has received substantial revenues in both NOK and foreign currency from the petroleum sector (the government's net cash flow). At the same time, the government earns considerable foreign currency income in the form of returns on the Government Pension Fund Global (GPFG). Some of this revenue is used each year to finance the non-oil budget deficit in line with the fiscal rule. Up until 2015, the government's net cash flow from petroleum activities exceeded the non-oil deficit. The difference was then transferred to the GPFG. From 2016, the situation has been the reverse. The government's net cash flow from petroleum activities is no longer sufficient to finance the entire non-oil deficit. Portions of the return on the GPFG are therefore transferred from the GPFG to be spent via the central government budget. At Norges Bank, foreign exchange transactions associated with the petroleum fund mechanisms are managed in a separate foreign exchange portfolio called the petroleum buffer portfolio (PBP). The transition from the previous situation with transfers to the GPFG to the current situation with transfers from the GPFG has resulted in changes in movements in this portfolio, both in the course of the month and during the year as a whole. While the level of the PBP previously rose through the month, it will now fall through the month. This results in a need to increase the size of the PBP ahead.

1. Introduction

Over time, the Norwegian government has received substantial revenues from the petroleum sector. The government's revenues from the petroleum sector, also called the government's net cash flow, comprise revenues in both NOK and foreign currency. NOK revenues primarily comprise oil taxes paid by oil and gas companies and dividend from Statoil, while foreign currency revenues are received in the form of revenues from the government's own petroleum activities via the State's Direct Financial Interest (SDFI). In addition, the government earns substantial income in the form of interest and dividends from the Government Pension Fund Global (GPFG). Since the capital in the GPFG is exclusively invested in instruments in foreign currency, the return on the GPFG is also in foreign currency.

The government's revenues from the petroleum sector are spent each year to finance a planned central government deficit, called the "non-oil budget

¹ Both authors work in Norges Bank Market Operations and Analysis. The views expressed in this commentary are those of the authors and do not necessarily reflect the views of Norges Bank. The authors would like to thank Tom Bernhardsen, Arne Kloster and Marit Øwre-Johnsen for valuable discussions and comments.

deficit”.² Petroleum revenue spending is governed by a “fiscal rule”. According to the fiscal rule, over time, the structural non-oil budget deficit shall equal the expected real return on the GPFG.

For many years, the government’s net cash flow from the petroleum sector has exceeded the non-oil budget deficit, with the difference between the net cash flow and the non-oil deficit transferred to the GPFG. Now the situation is the reverse. The government’s net cash flow from petroleum activities is no longer sufficient to finance the entire non-oil budget deficit. To cover the remaining deficit, portions of the return on the GPFG are transferred to the government for spending via the central government budget. The non-oil deficit may be written as follows:

$$(1) \text{ Non-oil budget deficit} = \text{Net cash flow from petroleum activities} + \text{Transfers from the GPFG} = \text{Oil taxes} + \text{Revenues from the SDFI} - \text{The SDFI's expenses} + \text{Dividend from Statoil} + \text{Transfers from the GPFG}$$

Norges Bank has been tasked by the Ministry of Finance with executing the foreign exchange transactions associated with the petroleum fund mechanism on behalf of the government.³ To manage these foreign exchange transactions, Norges Bank has established a separate portfolio, called the “petroleum buffer portfolio” (PBP). The PBP receives the government’s cash flow from petroleum activities in foreign currency and is used for transfers to and from the GPFG. Foreign currency revenues from the SDFI and transfers from the GPFG must be converted from foreign currency in order to be spent via the central government budget. In all, Norges Bank will purchase NOK and sell foreign exchange in an amount equal to the portion of the non-oil budget deficit that is not covered by the government’s NOK revenues from the petroleum sector. The size of the purchases of NOK will then be given by⁴:

$$(2) \text{ Norges Bank's purchases of NOK} = \text{Revenue from the SDFI} + \text{Transfers from the GPFG}$$

The transition from the previous situation with transfers to the GPFG to the current situation with transfers from the GPFG has resulted in changes in the management of foreign exchange transactions associated with the petroleum

² The central government budget is initially set up with a deficit with oil revenues excluded, and the government’s entire cash flow from petroleum activities are transferred to the accounts of the GPFG. Subsequently, the deficit is financed through an account reversal from the GPFG. In purely practical terms, NOK revenues from the government’s net cash flow are deposited directly in the government’s account with Norges Bank, while the PBP receives foreign currency revenues and credits the government’s account. If the net cash flow is higher than the non-oil deficit, the surplus is transferred to the GPFG. If the net cash flow is lower than the non-oil deficit, the difference is transferred from the GPFG. It is the transfers associated with the difference between the net cash flow and the non-oil deficit that affect the PBP and that are the focus of this commentary.

³ The petroleum fund mechanism is the system that channels government revenues from petroleum activities on the Norwegian continental shelf to spending via the central government budget and saving in the GPFG, with the capital in the GPFG being exclusively invested in instruments in foreign currency.

⁴ For the sake of simplicity, we have disregarded the SDFI’s revenues in NOK, since the SDFI’s revenues are primarily in foreign currency.

fund mechanism. The change entails a need to increase the level of the PBP. This commentary discusses what these changes mean for managing the necessary foreign exchange transactions in the period ahead.

2. Estimating Norges Bank's purchases of NOK associated with the petroleum fund mechanism

Up to and including 2013, the government's NOK revenues were greater than the non-oil budget deficit. Norges Bank then converted the portion of the government's NOK revenues that was not spent via the central government budget to foreign exchange and transferred this to the GPFG. **In 2014**, the government's NOK revenues were approximately equal to the non-oil budget deficit, and Norges Bank did not execute foreign exchange transactions on behalf of the government.

In 2015, the government's NOK revenues from the petroleum sector were no longer sufficient to cover the non-oil budget deficit. Thus, portions of the revenues from the SDFI needed to be converted to NOK for spending via the central government budget, while the remaining revenues from the SDFI were transferred to the GPFG. **Since 2016**, transfers have gone in the opposite direction. The non-oil deficit now exceeds the government's net cash flow, and the difference is covered by transfers from the GPFG. This means that Norges Bank must convert the sum of the foreign currency revenues from the SDFI and transfers from the GPFG to NOK. The transition from making transfers to the GPFG to making transfers from the GPFG has changed how the size of the PBP changes both through the month and during the year as a whole.⁵

To make the conversions as predictable as possible, Norges Bank purchases a fixed daily amount of NOK each month. The amounts to be converted are announced on the last trading day of the month prior to the purchases. In addition, it is Norges Bank's aim for the size of the foreign exchange transactions to vary as little as possible through the year. By accepting that the level of the PBP can fluctuate, foreign exchange transactions can be smoothed through the year despite seasonal variations in the SDFI's foreign currency revenue and changes in the net cash flow. Smoothing foreign exchange transactions through the year is intended to minimise disruptions in the foreign exchange market.

When determining the volume of the daily purchases of NOK, the total purchases of NOK for the entire year are set to equal the sum of foreign currency revenues from the SDFI and transfers from the GPFG. In practice, estimating monthly purchases of NOK is somewhat more complicated. The PBP receives foreign exchange revenue from the SDFI on an ongoing basis

⁵ For more details regarding how Norges Bank's foreign exchange transactions associated with the GPFG have changed over time and how the petroleum fund mechanism and these foreign exchange transactions affect Norges Bank's balance sheet, see Lerbak, M. N., K. Tafjord and M. Øwre-Johnsen (2016) "The petroleum fund mechanism and Norges Bank's foreign exchange transactions". *Economic Commentaries* 2016/1. Norges Bank.

through each month and credits the government with the corresponding amount in NOK. The amount of foreign currency revenues from the SDFI varies from month to month, owing to changes in oil and gas prices, among other reasons. In addition, there is considerable seasonal variation in revenue. Each month, Petoro (the state-owned oil company that administers the SDFI) provides updated estimates of the following month's foreign currency revenues and provides updated estimates of the SDFI's revenues for the year each quarter.

While the revenues from the SDFI are spread through the month, the transfers from the GPFG are made on the last trading day of the month. Each month, the Ministry of Finance announces the size of the transfer in NOK from the GPFG for the current month and an estimate of the transfer for the following month. In principle, transfers from the GPFG are to be smoothed across all months of the year. On the other hand, owing to changes in the estimates of the government's net cash flow or changes in the non-oil deficit, the actual transfer requirement may change during the year. If the changes in the transfers to/from the GPFG are substantial, this will affect the size of the PBP, given that Norges Bank tries to smooth foreign exchange transactions.

In its estimate of monthly purchases of NOK, Norges Bank uses updated information on foreign currency revenues from the SDFI, the transfers from the GPFG and the size of the PBP, and takes into account the desire to smooth purchases through the year. The monthly purchases of NOK are therefore given by:

$$(3) \text{ Norges Bank's purchases of NOK} = \text{Revenues SDFI} + \text{Transfer from SPU} + \text{Change in the balance of the PBP}$$

3. Movements in the petroleum buffer portfolio (PBP) when there is a transfer to the GPFG

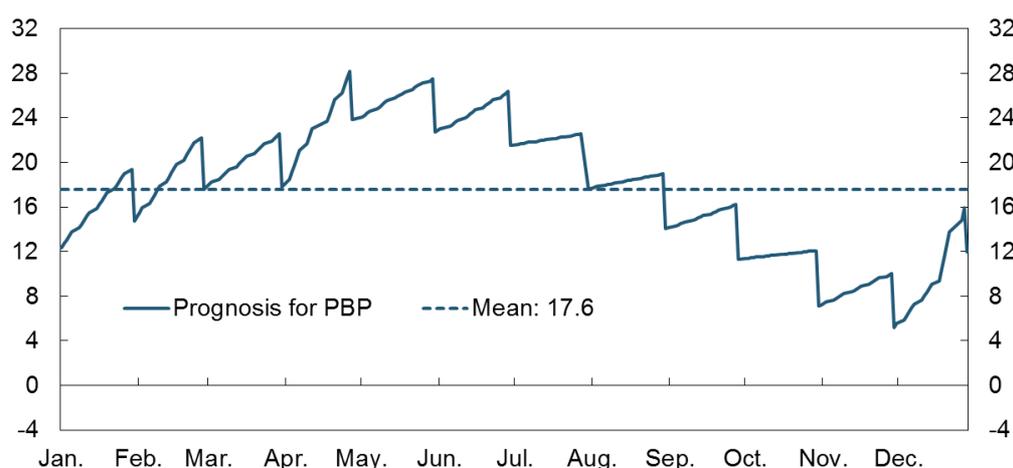
Each month, there will be a daily inflow into the PBP of foreign exchange in the form of revenues from the SDFI and an outflow of foreign exchange corresponding to the daily purchases of NOK. As long as the government's net cash flow exceeds the non-oil budget deficit, revenues from the SDFI will exceed the value of the purchases of NOK and the portfolio will transfer foreign exchange to the GPFG. The PBP will then increase gradually through each month before falling on the last trading day by an amount equal to the size of the transfer to the GPFG.⁶

A simple numerical example illustrates movements in the PBP through a year when the net cash flow from petroleum activities exceeds the non-oil deficit. Assume that the government's net NOK revenues from petroleum activities

⁶ Similarly, if the government's net cash flow is equal to the non-oil budget deficit, there will neither be a transfer to the GPFG or a transfer from the GPFG at the end of each month, and the foreign currency revenues from the SDFI will correspond to the daily purchases of NOK.

are NOK 20 billion and that the non-oil budget deficit is NOK 200 billion. Total purchases of NOK for the year will then be NOK 180 billion, or approximately NOK 700 million per day. If we assume that foreign currency revenues from the SDFI correspond to NOK 240 billion, the NOK value of monthly transfers to the GPFG will be NOK 5 billion. We assume further than the revenues from the SDFI follow a yearly seasonal pattern and that the level of the portfolio corresponds to NOK 12 billion at the beginning of the year. The movements in the PBP through the year will then be as shown in Chart 1:

Chart 1: Movements in the PBP when transfers are made to the GPFG. In billions of NOK



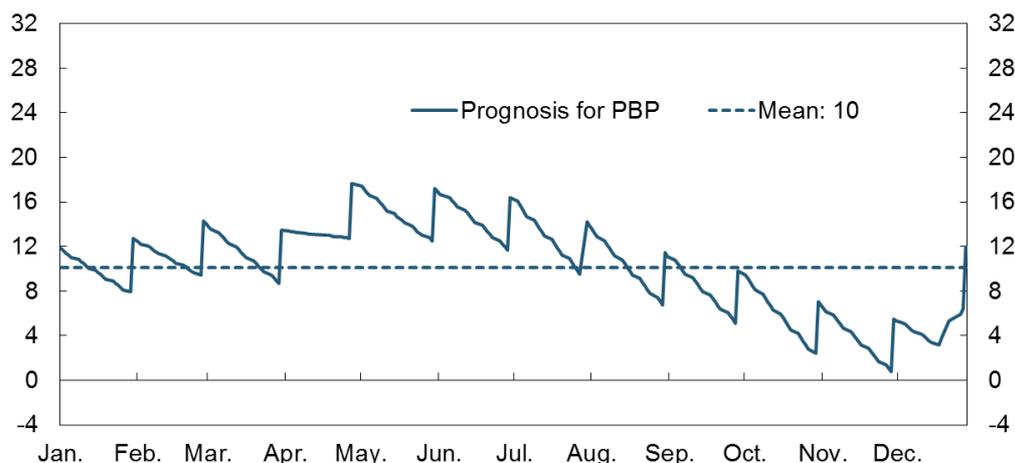
Source: Norges Bank

The chart shows that the level of the PBP increases through the month before falling on the last trading day by the size of the transfer to the GPFG. The reason that the level of the portfolio increases through the first months of the year and falls in the period to year-end is that SDFI revenues are normally somewhat higher at the beginning of the year and there are fewer trading days in the first half of the year than in the second half. In addition, NOK purchases take place only through the first half of December, while SDFI revenues are spread through the entire month. For that reason, the level of the PBP rises by a larger than normal amount in the two last weeks until the end of the year.

4. Movements in the petroleum buffer portfolio (PBP) when there are transfers from the GPFG

During a year when the government's net cash flow is less than the non-oil deficit, movements in the PBP will be different. As the example above, we assume total NOK purchases of NOK 180 billion, but the NOK value of SDFI revenues is now NOK 120 billion rather than NOK 240 billion. This suggests the same daily purchases of NOK as before, approximately NOK 700 million per day. On the other hand, there will be a need for a monthly foreign exchange transfer corresponding to NOK 5 billion from the GPFG rather than a transfer corresponding to NOK 5 billion to the GPFG. Chart 2 shows movements in the PBP through the year in this scenario (where the level of the PBP still corresponds to NOK 12 billion at the beginning of the year).

Chart 2: Movements in the PBP when transfers are made from the GPFG. I



Source: Norges Bank

When purchases of NOK exceed SDFI revenues, the level of the PBP will fall through the month before increasing on the last trading day by an amount equal to the transfer from the GPFG. Compared with the example with transfers to the GPFG, the level of the PBP is lower through the year, especially towards year-end.

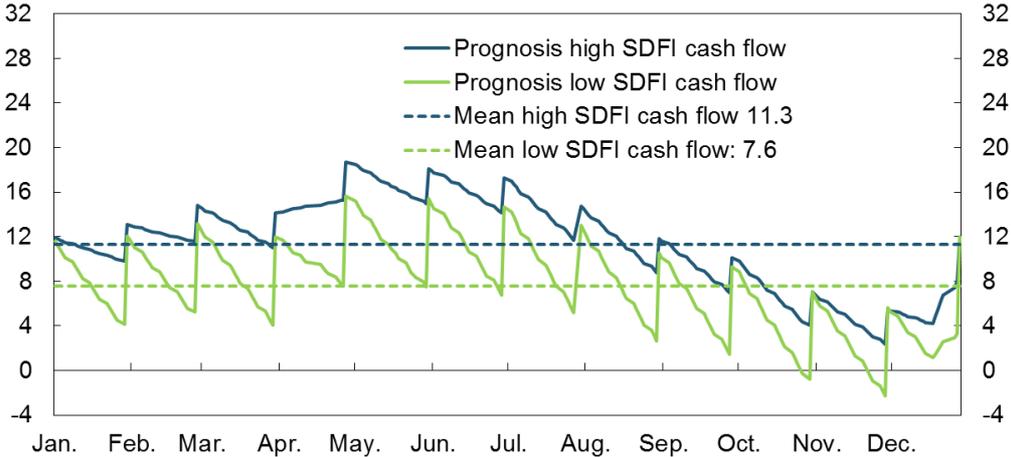
Even though the purchases of NOK in both examples are in equal amounts, the portfolio will be at a considerably lower level both from month to month and on average for the year as a whole. The level of the PBP at year-end is the same in both examples, but the movements during the year are very different. In the first example, where the PBP is built up through the month (transfers to the GPFG), the average level of the PBP will correspond to NOK 17 billion. The lowest level of the portfolio will correspond to around NOK 5 billion. In the second example, where the level of the PBP falls through the month (transfers from the GPFG), the average level of the portfolio will correspond to only NOK 9.4 billion through the year, and at the same time the lowest level of the portfolio will be close to zero.

For a given level of total purchases of NOK, lower revenues from the SDFI relative to the transfer from the GPFG will result in greater monthly fluctuation in the PBP. Lower revenues from the SDFI mean that less of the purchases of NOK is financed on an ongoing basis through the month, and that the necessary transfer from the GPFG must be larger. The result is that the level of the PBP falls more through the month before rising markedly on the last trading day of the month. The transition from transferring foreign exchange to the GPFG to transferring foreign exchange from the GPFG causes larger monthly fluctuations in the PBP and the fluctuations become larger the more of the NOK purchases are financed by transfers from the GPFG relative to revenues from the SDFI. To manage this, the PBP needs to be larger.

The effects on the PBP of lower SDFI revenues relative to transfers from the GPFG are illustrated in Chart 3. The chart shows two hypothetical paths for

the PBP through the year under different revenue scenarios for the SDFI. At the beginning of the year, the level of the PBP corresponds to NOK 12 billion, and the estimate of total purchases of NOK is NOK 180 billion. This corresponds to purchases of NOK of around NOK 700 million per day. If we begin with SDFI revenues corresponding to NOK 140 billion broken down according to the yearly seasonal pattern, movements in the PBP will be as illustrated by the blue line.

Charts 3: Movements in the PBP under different scenarios for foreign currency revenues from the SDFI



Source: Norges Bank

The green line illustrates movements in the PBP if the NOK value of foreign currency revenues from the SDFI is assumed to be NOK 80 billion instead of NOK 140 billion. The monthly volatility in the level of the PBP will then be greater, and the level of the PBP will be below zero towards the end of the year.⁷ In this example, the size of the PBP is too small to facilitate purchases of the NOK 180 billion necessary to cover the non-oil deficit.

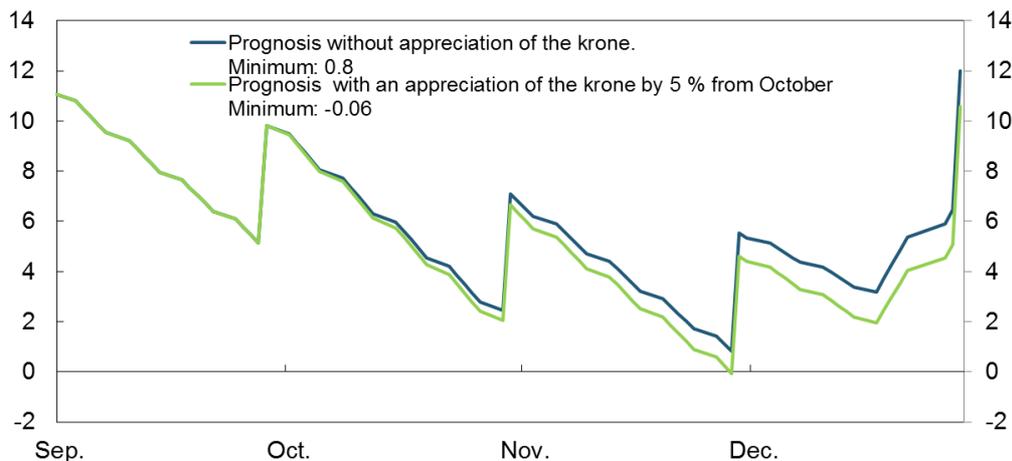
The example above illustrates that the lowest level of the PBP through the month can set a limit on the daily purchases of NOK in periods when purchases of NOK and transfers from the GPFG are increasing. Norges Bank wishes to avoid a situation where the level of the portfolio falls below zero. Therefore, in periods when transfers from the GPFG increase, it will be necessary to build up the PBP in order to manage fluctuations in the portfolio through the month.

⁷ In the examples considered so far, it is assumed that a change in revenues from the SDFI will always result in a corresponding change in transfers from the GPFG. In reality, this is not the case. Each month, the Ministry of Finance determines the amount of the transfer from the GPFG for the current month. From month to month it is very difficult to estimate the size of SDFI revenues, both for the current month and especially for coming months. Therefore, the transfers from the GPFG do not automatically rise if revenues from the SDFI fall.

5. Movements in the krone exchange rate

Movements in the krone exchange rate may also be a risk factor for the size of the PBP through the year. Each month, the PBP receives foreign exchange and purchases NOK. Assuming that Norges Bank's purchases of NOK are fixed (announced in advance on the last trading day of the previous month), an appreciation of the krone will result in an increase in total foreign exchange sales (Norges Bank must sell more foreign exchange to purchase the same amount of NOK). Since the revenues from the SDFI are in foreign currency, in the event of a krone appreciation, the level of the PBP will fall through the month. Therefore, the level of the PBP must be high enough to manage fluctuations in the krone exchange rate. Chart 4 illustrates how a 5 percent appreciation of the krone from October can affect movements in the PBP through the last months of the year. In the chart, the daily purchases of NOK are unchanged at NOK 700 million, and it is assumed that the transfers from the GPFG are kept unchanged. The chart shows that owing to the krone appreciation, the level of the PBP falls below zero the end of November if the purchases are maintained.

Chart 4: Movements in the PBP following a 5 percent appreciation of the krone from October. In billions of NOK



Source: Norges Bank

6. Movements in the PBP in the period ahead

An aim of Norges Bank is for the size of foreign exchange transactions to be as evenly distributed as possible through the year. On the other hand, changes in cash flows and seasonal variations in the SDFI's foreign currency revenues will result in an uneven flow of foreign exchange through the year. The PBP must therefore be large enough to enable Norges Bank's foreign exchange transactions to be kept stable through the year, despite fluctuations in actual cash flows.

The transition from the previous situation with transfers to the GPFG to the current situation with transfers from the GPFG has resulted in changes in the management of foreign exchange transactions associated with the petroleum fund mechanism. The level of the PBP will now fall through the month and

then rise on the last trading day in an amount equal to the transfer from the GPFG. The examples above have shown that the necessary size of the PBP will vary over time in pace with the share of the non-oil deficit that must be covered by a transfer from the GPFG. The larger the transfer from the GPFG is, the larger the change will be in the PBP through the month. This, again, results in a need for a larger portfolio.

The share of the purchases of NOK that must be covered by transfers from the GPFG will rise in pace with the decline in activity on the Norwegian continental shelf and in the net cash flow. In recent years, the net cash flow has fallen sharply from a peak of nearly NOK 400 billion in 2012 to an estimated NOK 125 billion in 2016⁸. At the same time, the non-oil budget deficit has risen sharply from around NOK 100 billion in 2012 to an estimated amount of just over NOK 220 billion in 2016. Owing to a low net cash flow, a larger portion of the non-oil budget deficit must be covered by transfers from the GPFG. As shown above, larger transfers from the GPFG relative to revenues from the SDFI will result in greater monthly fluctuations in the PBP. This requires a larger portfolio to prevent the level of the PBP from falling below zero during the year. Therefore, to manage the foreign exchange transactions in connection with the petroleum fund mechanism in the years ahead, there will be a need to build up the PBP.

⁸ See Tabell 2.1 in the National Budget for 2017.