

No. 06 | 2012

# Staff Memo

## Background information, annual address 2012

*Norges Bank Monetary Policy*

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**ISSN 1504-2596 (online only)**

**ISBN 978-82-7553-652-3 (online only)**

## **Estimated real return on the Government Pension Fund Global (GPFG)**

The expected real return on a portfolio can be decomposed into a risk-free real return and expected compensation for the risk exposure of the portfolio. Compensation for risk can be divided into a credit premium (for bonds) and an equity premium.

### ***Risk-free real return***

A common measure of risk-free real return is the yield on inflation-linked government securities issued by countries with a high credit rating. In our calculation, we use US and UK 10-year inflation-linked bonds<sup>1</sup>. Over the past 10 years, and particularly the past three, real yields on these bonds have fallen considerably.

An allocation of 60 percent to presumably safe bonds in 2001 is applied in the calculation of the estimate for expected real return in 2001. In the year and a half up to spring 2001, US inflation-linked bond yields averaged 3.9 percent, while UK yields were on average 2.2 percent. Based on these figures, the risk-free real return can be estimated at 3 percent in 2001. Today, investments in presumably safe bonds make up around 25 percent of the GPFG. In 2011, 10-year inflation-linked bond yields for the US and the UK averaged around 0.5 percent.

### ***Bonds with credit premiums***

Around 15 percent of the portfolio is invested in other, higher-risk bonds. At the end of 2011 the level of yield on these bonds was approximately 1.3 percentage points higher than the risk-free real return. Adjusted for bankruptcy probability and post-bankruptcy value, 1 percentage point is our estimate of expected annual excess return – the credit premium – over the next 10 years.

### ***Equities***

Today, 60 percent of the portfolio is allocated to equities. Based on historical data for a number of countries and time periods, the return on equities above the risk-free real return can be estimated at 3.8 percentage points.<sup>2</sup> Premiums in equity markets are, however, highly uncertain. A corresponding analysis in 2001 would have resulted in an estimated equity premium of about 4.6 percentage points.

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<sup>1</sup> Figures for US inflation-linked bonds are 10-year “Treasury Inflation Protected Securities” (TIPS), while figures for UK inflation-linked bonds are 10-year “Index-linked Gilts”.

<sup>2</sup> The calculations are based on Dimson-Marsh-Staunton Global Returns data (Morningstar), for the period 1900 to 2010.

**Expected total real return**

Given the current investment strategy, with an estimated risk-free real interest rate of about 0.5 percent, a credit premium of 1.0 percentage point and an equity market premium estimated at 3.8 percentage points, the expected annual real return is estimated at about 3 percent (see table below). The estimate is based on the following calculation:

Return risk-free bonds × share risk-free bonds  
 +Return other bonds × share other bonds  
 +Return equities × share equities  
 =expected real return GPFG

$$0.5 \times 0.25 + (0.5+1) \times 0.15 + (0.5+3.8) \times 0.6 = 2.9$$

Applying the same method to figures for 2001, the expected real return would have been between 4 and 5 percent.

Expected real return 2001:

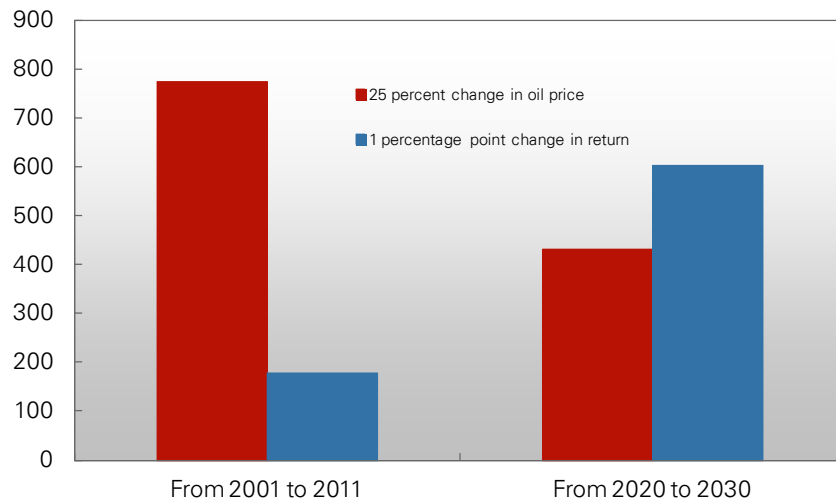
$$3 \times 0.6 + (3+4.6) \times 0.4 = 4.8$$

**Table: Expected real return**

|      | Percent               |                |                | GPFG holdings   |                           |          | Expected real return |
|------|-----------------------|----------------|----------------|-----------------|---------------------------|----------|----------------------|
|      | Risk-free real return | Credit premium | Equity premium | Risk-free bonds | Bonds with credit premium | Equities |                      |
| 2012 | 0.5                   | 1              | 3.8            | 25 %            | 15 %                      | 60 %     | 2.9                  |
| 2001 | 3                     | N/A            | 4.6            | 60 %            | 0 %                       | 40 %     | 4.8                  |

## Impact of changes in oil prices and return on size of GPFG

Effect on the size of GPFG<sup>1)</sup> of change in oil price and return  
In billions of NOK. Constant 2012 prices



1) Government Pension Fund Global. Effect on the size of Fund after 10 years.  
Sources: Ministry of Finance and Norges Bank

The red bars illustrate the effect of a permanent 25 percent change in the oil price on the size of the GPFG. In the chart, these effects are compared with the effects of a 1 percentage point change in the real return per year (blue bars). The chart shows the total impact after 10 years, starting in 2001 and 2020 respectively.

In the calculations for the period 2001 to 2011, the actual oil price and net cash flows from the petroleum sector have been applied in the benchmark scenario. For the period ahead, assumptions are based on the net government cash flow from the petroleum sector and the oil price in the National Budget for 2012 (Meld.St. 1 (2011-2012)). The red bar for the period 2020 to 2030 thus shows how much smaller/larger the GPFG could be if the oil price is 25 percent lower/higher than projected in the National Budget for 2012.

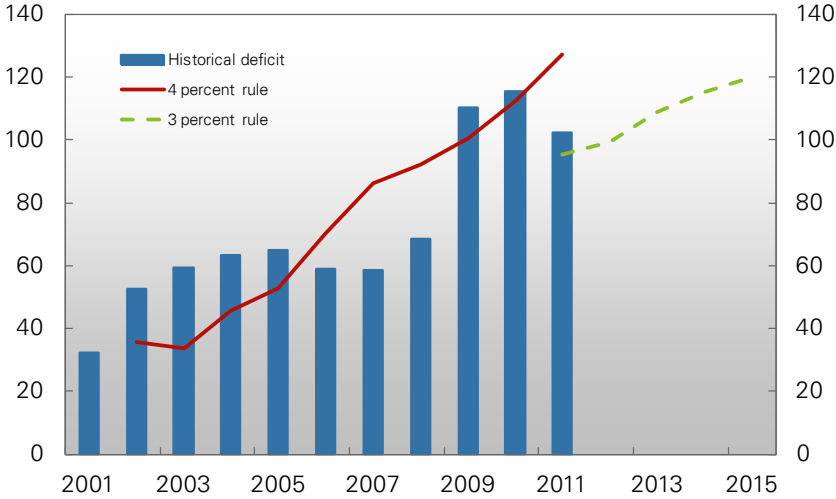
The variables in the chart are in constant 2012 prices. The GPFG is measured in terms of international purchasing power. The figures are therefore deflated by global inflation. Historically, the weighted consumer price index in the countries where the GPFG is invested has been used. Annual global inflation ahead is assumed to be 2 percent.

In the analysis of the effect of oil prices, the non-oil deficit has been set equal to the actual real return for all the years. Thus, only changes in net cash flow from the petroleum sector affect the size of the GPFG. In addition, it has been assumed that a 25 percent change in the oil price does not change the volume of production in the petroleum sector and that the government's share of the cash flow from the petroleum sector is constant.

In the analysis of the change in real return, the net government cash flow from the petroleum sector is assumed to be unaffected. In this analysis, the return deviates by 1 percentage point from the annual withdrawal from the GPFG, i.e. the withdrawal is 4 percent per year, while the return is 3 or 5 percent.

# Structural deficit

Structural non-oil deficit and different rules for withdrawal from GPFG<sup>1)</sup>  
 Constant 2012 prices. In billions of NOK. 2001 – 2015<sup>2)</sup>



1) Government Pension Fund Global  
 Sources: Ministry of Finance and Norges Bank

The chart illustrates the structural non-oil budget deficit for 2001 to 2011. The red line shows how large the deficits would have been with a mechanical application of the 4 percent rule in the period between 2001 and 2011. The green line shows estimated budget deficits with a 3 percent withdrawal from the GPFG ahead.

For 2011 estimates are based on the structural non-oil budget deficit in the rebalanced government budget for 2011 (Prop. 45 S (2011–2012)). Figures have been translated into 2012 prices using the price deflator used in the central government budget. The projections using the 3 percent rule are based on calculations by the Ministry of Finance in Table 3.7 in the National Budget for 2012. The calculations have been updated with the GPFG’s actual value as of 1 January 2012. As an illustration, both the withdrawal rate and the real return are assumed to be 3 percent as from 2012.