Energy Policy 63 (2013) 870–876

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Avoiding the resource curse the case Norway ☆

Steinar Holden *

Department of Economics, University of Oslo, Box 1095, Blindern, 0317 Oslo, Norway

HIGHLIGHTS

- In Norway, the sizeable petroleum resources have led to higher economic growth and a higher GDP per capita, measured in purchasing power parities.
- This paper describes the key features of the Norwegian management of the petroleum resources.
- The main focus is on the management of the revenues from the petroleum sector
- Effects of the petroleum sector on the Norwegian economy more generally are also discussed.

ARTICLE INFO

Article history:
Received 9 January 2013
Accepted 5 September 2013
Available online 1 October 2013

Keywords:
Resource curse
Oil
Fiscal policy

ABSTRACT

In many countries, natural resources have been detrimental to the economic development. The literature on "the resource curse" shows a bleak relationship: countries with large natural resources generally experience lower economic growth than other countries. Norway does not fit into this picture. Economic growth has much higher than in most other industrialized countries. This paper describes the key features of the Norwegian management of the petroleum resources. The main focus is on the management of the revenues from the petroleum sector, but the effects of the petroleum sector on the Norwegian economy more generally are also discussed.

1. Introduction

In many countries, natural resources have been detrimental to the economic development. The literature on "the resource curse" shows a bleak relationship: countries with large natural resources generally experience lower economic growth than other countries (see e.g. Sachs and Warner, 1995, and Mehlum et al., 2006). Norway does not fit into this picture. Economic growth has much higher than in most other industrialized countries, as GDP per capita measured in purchasing power parities has increased from 5 percent below the OECD average in 1970 to 70 percent above the average in 2010. Furthermore, most of the oil revenues are saved in a Government Pension Fund, from which only the expected real return of 4 percent is used to cover the non-oil budget deficit. Thus, it seems of interest to see how this was done, even if it might be difficult for countries with a different institutional and historical background to adopt the same policies.

In this paper I will describe the key features of the Norwegian management of the petroleum resources. The main focus will be on management of the revenues from the petroleum sector, but I will also briefly discuss the effect of the petroleum sector on the Norwegian economy more generally. The aim is to give a concise presentation, and the interested reader is referred to Bjerkholt et al. (1990), Norwegian Petroleum Directorate (2013) or Eika et al. (2010) for more detailed treatments. Like this paper, Mehlum et al. (2008) and Phillips (2008) discuss the Norwegian petroleum policy. However, these papers put more emphasis on the comparison with other countries, while the present paper is more narrowly focused on the Norwegian policy and experiences.

The management of the petroleum resources reflects the view among Norwegian decision makers that the resources belong to the nation, and that the development should benefit the society as a whole, including future generations. This ambition was challenging for several reasons. The oil revenues are temporary, as they are based on a non-renewable natural resource. Furthermore, they are highly volatile, due to fluctuations in the oil price and uncertainty in the size of the resources. Recovering the oil from the ground is also technically very challenging, requiring involvement of international oil companies.

To achieve the ambition, a number of policies were adopted on different areas. The regulation and taxation system should ensure that the oil revenues were exploited in a safe and

☆The paper was originally prepared for presentation at the Conference Oil Revenue Management in Ghana, April 26–27 2011, organised by FES Ghana. I am grateful to an anonymous referee for useful comments, to Halvor Mehlum, Kalle Moene and Daniel Spiro for helpful discussions, to the Norwegian Ministry of Finance for useful input, including some of the charts, and to Øystein Rembar for research assistance. The paper has also benefited from comments and discussion at the conference. The responsibility for the content of the presentation remains my own. The paper is part of the research activities at the Centre of Equality, Social Organization, and Performance (ESOP) at the Department of Economics, University of Oslo. ESOP is supported by the Research Council of Norway.

* Tel.: +4722855156; fax: +4722855035.
E-mail address: steinar.holden@econ.uio.no

0301-4215/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.enpol.2013.09.010

profitable way, and that the bulk of the oil revenues were reaped by the state. An additional aim was to obtain a significant Norwegian participation in the petroleum activities, so that Norwegian companies could build up expertise and take part in the oil and gas sector. The policy was formulated in the form of Ten oil commandments, unanimously adopted by the Norwegian Parliament (Stortinget) in June 1972 (see Appendix A). Subsequently, the policies for the management and spending of the petroleum wealth have assumed more importance, with the establishment of the Petroleum Fund (now the Pension Fund) in 1990, and the adoption of the fiscal rule in 2001.

The paper is organized as follows. Section 2 gives a brief background of the petroleum activities, while Section 3 describes the challenges related to "Dutch disease" and the "Resource curse". Government revenues for the petroleum sector are discussed in Section 4, Section 5 describes the management of the petroleum wealth, and Section 6 presents the fiscal rule. The further effects on the Norwegian economy are described in Section 7. Section 8 sums up the possible lessons for other countries.

2. Brief background

The oil resources on the Norwegian shelf were discovered in the 1960s, after an initiative taken by Phillips Petroleum Company. The Norwegian authorities declared ownership of the resources, but the first explorations were to a large extent conducted and financed by international oil companies. Oil production started in June 1971, on the Ekofisk field. The Norwegian involvement increased gradually during the 1970s, when Norwegian oil companies, the state owned Statoil and private companies Hydro and Saga were given more important roles. From 1972 on, Statoil took a 50 percent ownership share of all new fields. However, this has later been modified, so that Statoil's share may now be higher or lower than this. Statoil was privatized in 2001, but the government has retained a 67 percent majority ownership. The state also has a significant passive ownership share in all fields, via the State's Direct Financial Interest SDFI. The SDFI was established in 1985, when it took over half of Statoil's ownership shares. Box 1 describes the current licensing system for the petroleum resources.

Until 1980, oil revenues were fairly small and Norway ran with sizeable current account deficits to finance the necessary investments. The rise in oil prices in the late 1970 increased the importance of the oil sector, and in the first part of the 1980s, petroleum production totaled 15–20 percent of GDP (Bjerkholt et al., 1990, p. 28). The sharp fall in the oil price in 1986 took the share down to less than 10 percent of GDP in the late 1980s. The petroleum sector is now an important part of the Norwegian economy. In 2012, the petroleum sector constituted 23 percent of GDP, 30 percent of government revenues, 29 percent of total investments and 52 percent of total exports (Norwegian Petroleum Directorate, 2013).

The Norwegian Petroleum Directorate's estimate for discovered and undiscovered petroleum resources on the Norwegian shelf are 13.6 billion Sm^3 oil equivalents (or 86 billion barrels of oil equivalents). Of this, 44 percent have already been produced, 37 percent have been discovered, while the estimate for the undiscovered is 2.6 billion Sm^3 oil equivalents, or 19 percent (Norwegian Petroleum Directorate, 2013). The oil production has fallen considerably since the top in year 2000, but this has been compensated by an increase in the production of gas, cf. Fig. 1. After many years without important new discoveries, several new discoveries were made in 2010 and 2011. There is considerable uncertainty as to the size of the undiscovered reserves.

Using a real interest rate of 4 percent, the net present value of the future cash flow from the petroleum sector is estimated to some 3700 billion 2013-NOK (about 480 billion euros), and the government share is 88 percent of this, 3270 billion 2013-NOK, (National Budget, 2013).

Box 1–The licensing system

The Norwegian licensing system consists of two types of licensing rounds. The first is the numbered licensing rounds which comprise less mature parts of the shelf. These rounds have been used since 1965, and in recent years have been held every second year. The oil companies are invited to nominate blocks they would like to see announced and, on this basis, the Government determines a certain number of blocks for which companies can apply for production licenses.

The other licensing round system entails award of production licenses in predefined areas (APA) in mature parts of the continental shelf introduced by the Government in 2003. This system entails the establishment of large, predefined exploration areas comprising all of the mature acreage on the shelf. Companies can apply for acreage within this defined area. The area will be expanded, never reduced, as new areas are matured. A regular, fixed cycle is planned for licensing rounds in mature areas. So far, ten annual rounds have been carried out (APA 2003–2012).

Under both types of licensing rounds, applicants can apply individually or in groups. The Ministry of Petroleum and Energy awards production licenses based on impartial, objective, non-discriminatory and announced criteria. The Ministry also designates an operator for the joint venture, to be responsible for the operational activities authorized under the license. The production license applies for an initial period (exploration period) that can last up to ten years (Norwegian Petroleum Directorate, 2013).

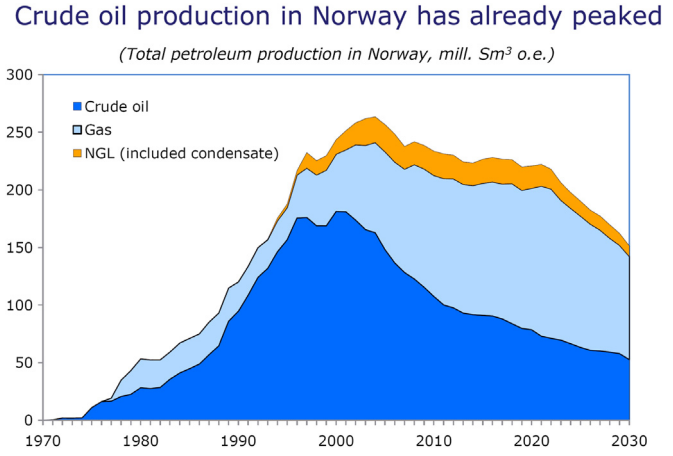

Fig. 1. Petroleum production—historic data and forecasts. NGL is a natural gas liquids.
Source: The Norwegian Ministry of Finance

3. Challenges—"Dutch disease" and "the resource curse"

From the outset, Norwegian economists were concerned about the challenges that the petroleum resources presented for the Norwegian society. The experiences from the Netherlands loomed large in the discussions, the so-called Dutch disease (Corden and Neary, 1982). Netherlands had considerable revenues from production of natural gas in the 1960s. However, the revenues led to increased public consumption and a higher domestic cost level, which caused problems for the manufacturing sector of the country. The economic mechanism is simple: higher domestic

demand increases demand for non-traded and traded goods. Traded goods can be bought from other countries, but non-traded goods have to be produced at home. The increased demand for non-traded goods pushes up non-traded prices, leading to a real appreciation of the currency, either via nominal appreciation or higher domestic inflation.

The economic mechanisms behind the Dutch disease have also been at work in Norway. Wage costs have increased considerably relative to trading partners, partly due to higher nominal wage growth and partly due to an appreciation of the Norwegian krone. In 2003, the hourly wage costs in the manufacturing sector was 26 percent above our trading partners in the European Union, and in 2012, this had increased to 69 percent (NOU, 2013: 7). However, the reduction in the size of the manufacturing sector relative to the overall economy over the last 40 years have been rather similar to that of several other advanced countries, see Fig. 2. In part, this reflects that reduced traditional manufacturing exports have been compensated by increased deliveries to the manufacturing sector. Using a Bayesian Dynamic Factor Model, Bjørnland and Thorsrud (2013) find no evidence of Dutch disease in Norway, but they do find evidence of a two-speed economy, with non-tradeables growing at a much faster pace than tradeables.

A second challenge, mentioned in the introduction, is emphasized in a large literature which finds that resource-abundant countries on average have experienced lower economic growth than resource-poor countries over the last four decades. However, there is large variation in the experiences. In many countries, natural resources have contributed to political instability, corruption and some cases also warfare. In other countries, the resource has been used to the benefit of the country, leading to higher growth and income than in neighboring countries. Norway clearly belongs in the second group. One illustration is given in Fig. 3, which shows that from the outset of the oil age in the mid-1970s, there has been a considerable, but gradual, increase in GDP per capita of Norway relative that of Sweden, a neighboring country which is rather similar on most accounts except for the oil resources. More formally, Mideksa (2013) compares Norw ay to a synthetic index of similar countries, and finds that about 20 percent of the annual GDP per capita increase of Norway is due to the endowment of petroleum resources.

A key explanation for the variation across resource-abundant countries is the quality of the political institutions. In countries with producer friendly institutions, with good protection of property rights, reliable public bureaucracy, and little corruption,

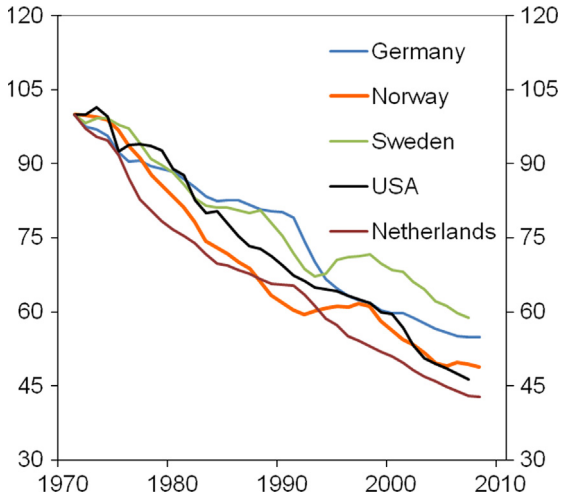

Fig. 2. Hours worked in the manufacturing sector, as share of hours worked in the overall economy.
Source: The Ministry of Finance

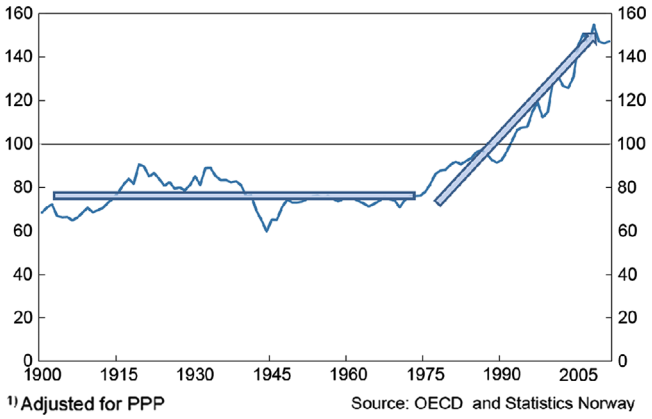

Fig. 3. GDP per capita in Norway, adjusted for PPP, where Sweden = 100.
Source: Olsen (2013)

natural resources are more likely to lead to economic growth (Mehlum et al., 2006, 2008). When oil was discovered in Norway, it already had a long and stable tradition of democratic rule. It had a well-functioning state bureaucracy.

4. Government revenues from the petroleum sector

The government receives revenues from the petroleum sector via several channels. Most importantly, there is a specific tax system for the petroleum sector, which takes into account that profits are much higher in this sector due to the exploitation of a valuable natural resource. Thus, in addition to the ordinary 28 percent tax applying to profits in all firms, there is a 50 percent profit tax applying only to the petroleum sector. Hence, the government receives in total 78 percent tax on profits from the oil companies. (There are also some additional fees; the CO^2 fee and area fee, but these are of minor importance.) However, there is also an uplift scheme, which shelters a normal return of 7.5 percent on the costs of the depreciable assets from the special 50 percent. Due to a widespread view that the oil companies due to limited capacity leave some small reservoirs unexploited, the government has also encouraged new companies to enter by allowing them to carry losses forward if they do not have revenues from existing fields to cover the costs of exploring new ones. From 2005, the government has even made payments to cover the tax value of losses associated with exploration activities.

The initial tax system was different. There was a royalty on sales revenues which varied from 8 to 16 percent. In 1975, a special tax on revenues of 25 percent (later increased to 35 percent) was introduced (Bjerkholt et al., 1990, p. 26). When the oil price fell in 1986, tax rates were reduced somewhat to ensure that petroleum production remained sufficiently profitable for the oil companies.

The second important source of government revenue is the direct ownership via the SDFI. SDFI now has a passive owner share in all active projects. Furthermore, the government has a two-thirds ownership share in Statoil, and thus receives a corresponding share of the dividends from this company. Fig. 4 displays the evolution of the government revenues over time.

The tax system has worked well. On the one hand, one must ensure that the companies have the appropriate incentives so that they take decisions that lead to an optimal production of oil and natural gas, taking into account production costs and the risk of accidents. This requires that the oil companies make sufficient profit on their activities, implying that the tax cannot be too high. On the other hand, the tax rate must be sufficiently high so that the government receives the bulk of the revenues. The tax rate of

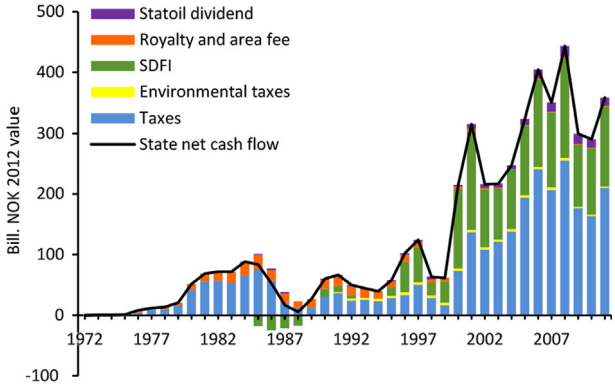

Fig. 4. The net government cash flow from petroleum activities.
Source: The Norwegian Petroleum Directorate (2013)

78 percent is fairly high. However, the tax system is seen as credible and transparent, implying that private firms, also foreign, view the Norwegian sector as an attractive area for business.

5. Managing petroleum wealth

In the mid-1970s, the increase in the oil activities combined with increased public spending led to a sharp rise in the cost level relative to our trading partners, and subsequent economic problems (Cappelen, 2011). Thus, to avoid a repetition of these problems, a government commission (NOU, 1983: 27: Tempoutvalget) headed by deputy governor of the central bank, Hermod Skånland, in 1983 suggested the establishment of a buffer fund, to ensure that the increasing oil revenues would not lead to a corresponding increase in the spending of the oil income. The commission argued that the oil revenues were not due to production in the ordinary sense, but rather should be seen as transformation of wealth, from a natural resource to financial wealth. The commission also discussed the possibility of a larger financial fund, similar to the current Pension Fund. However, in the commission's view, politicians would be unable to save a large amount of money in a fund abroad, because there would always be strong political pressure for increased domestic spending. Thus, the commission argued that production should be undertaken in a moderate pace, to ensure that resource wealth was saved for the future.

In the 1980s, the idea of a government oil fund received increasing support, and the conservative Willoch-government supported the idea in the Long Term Program in 1986 (Gjedrem, 2011). In 1990, the Petroleum Fund was established (the name was changed to the Pension Fund in 2006, to emphasize an important motivation for saving the money). It was decided that all government net revenues from the petroleum sector would be transferred to the Fund. However, the Fund would be integrated in the ordinary government budget, so in case of a deficit in the ordinary budget, there would be an automatic deduction from the Petroleum Fund. The idea was to avoid that the politicians could “pretend” that they were saving in the Fund, while they at the same time borrowed to finance the ordinary budget spending. Third, the money from the Fund could only be used on the ordinary government budget. Thus, the money from the Fund could not be used finance purposes which were not given priority in the ordinary budget procedure in Stortinget (the parliament) (Gjedrem, 2011).

Due to the fall in the oil price and the long lasting downturn of the Norwegian economy, the oil revenues which the government received from the oil sector in the early 1990s were much smaller than in the first part of the 1980s. Thus, no actual saving took place, and no money was put into the fund until several years later, in 1996.

The law of the Petroleum Fund made clear that the wealth should be invested in foreign assets. This served the double purpose of both providing currency income from the return on the assets, as well as avoiding that increased investments in Norway pushed up the already high Norwegian cost level. Furthermore, it was considered that Norwegian companies already have satisfactory access to capital in the form of possibilities to raise equity and obtain loans in the capital market.

The central bank, Norges Bank, was given the task of handling the fund. Norges Bank already had experience from managing the currency reserves, it was well-respected, and it already had the function as the bank of the state (Gjedrem, 2011). The fund was supposed to have a diversified portfolio, with both equity and fixed income, and with weights depending on the overall market shares with a slight preference for Europe, due to the shorter geographical distance. The current weights imply that the asset distribution should be 50–70 percent in equities, 30–50 percent in fixed income, and 0–5 percent in real estate. The regional distribution depends on the asset type. For equities, the regional distribution of equities is based on market weights, i.e. the relative size of the regional equity markets, while for fixed income it is based on GDP-weights, to avoid that countries with high debt are given a large weight in the portfolio.

The ultimate owner of the Pension Fund is the Norwegian parliament, on behalf of the Norwegian state. The parliament decides how the Pension Fund should be managed, and who should be responsible for doing so. The Ministry of Finance is the formal owner. It defines the benchmark asset allocation, and monitors and evaluates the operational management. As noted, the central bank, Norges Bank, is the operational manager. In 1998, the central bank established a separate asset management entity, Norges Bank Investment Management NBIM. NBIM implements the asset allocation defined by the Ministry of Finance. It is supposed to actively manage the portfolio within risk limits relative to the benchmark portfolio, with the aim of achieving excess returns. It also exercises the ownership rights. NBIM has been able to keep costs down, so that the annual management costs are below 0.1 percent of the value of the Fund. The return has been fair, with an average annual real return above management costs of 3.25 percent from the Fund started to invest money in 1998 until April 2013 (Slyngstad, 2013).

A key feature of the asset management is transparency, reports and supervision. The actual asset management is undertaken by internal managers in NBIM, as well as external managers with a task from NBIM. These managers are supervised by the NBIM Control and Compliance Unit. NBIM makes comprehensive reports on its asset portfolios and strategies in quarterly reports and other publications. NBIM itself is supervised and controlled by The Executive Board of Norges Bank and Norges Bank's internal audit. Further up, there is supervision of Norges Bank by Norges Bank's Supervisory Council as well as by The Ministry of Finance. The Ministry of Finance is supervised by the Office of Auditor General.

6. The fiscal rule

In the late 1990s, the oil revenues increased, and so did the inflow of money to the Fund. However, there was no policy guideline as to how much of the oil revenues should be spent, and how much should be saved. The memories of the downturn and the long period of weak public finances after the fall in the oil price in 1986 gave motivation for a clear rule which ensured that a large part of the revenues was saved. In 2001, the Social Democratic government headed by Jens Stoltenberg introduced a new fiscal rule to this end.

The idea behind the fiscal rule was that the spending of the oil revenues should be equal to the expected real return from the Pension Fund. Thus, the Fund would grow when new oil revenues flowed in, but as one would only withdraw the expected return,

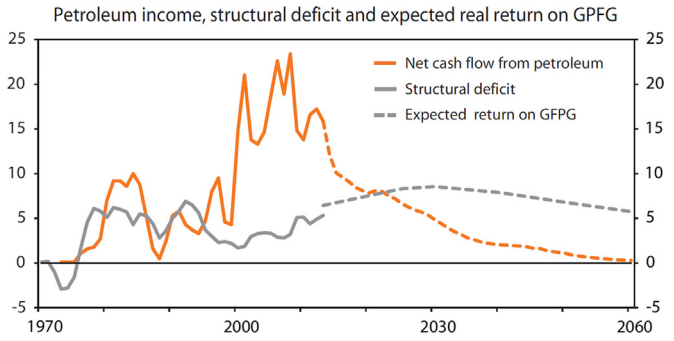

Fig. 5. Petroleum income, non-oil structural budget deficit and the expected real return in percent of Mainland-GDP.
Source: The Norwegian Ministry of Finance

the Fund would never be smaller, in expected terms. This rule would enable the government to run with a permanent non-oil budget deficit, allowing for higher public spending and/or lower taxes than would be possible without the oil revenues. Thus, the Pension Fund and the fiscal rule would ensure that the large, volatile and temporary net cash flow from the petroleum sector is transferred to a stable supplement to the government budget. As shown in Fig. 5, the Ministry of Finance expects that the real return from the Pension Fund will be sufficient to finance a non-oil structural budget deficit of more than 6–7 percent of mainland GDP in the future decades. As the GDP grows over time, the return from the Pension Fund will gradually diminish as a share of GDP, even if it remains constant in real expected terms for the entire future. Thus, the oil revenues allow higher public spending and/or lower taxes than would otherwise have been possible for the entire future.

The rule has received broad political support, and has been followed by subsequent governments, both the Centre-Right government headed by Kjell Magne Bondevik, and the coalition government at the time of writing headed by Jens Stoltenberg from the Labour Party.

The design of the fiscal rule has also two other objectives, which is to avoid procyclical fiscal policy and to mitigate the adjustment costs when the spending of the oil revenues increases. To achieve these objectives, the fiscal rule include the following main features:

- The entire net cash flow from the Petroleum sector should be transferred to the Petroleum Fund (now the Pension Fund, GPFG).
- The Pension Fund should be invested in a diversified portfolio abroad.
- Each year, the expected real return from the Pension Fund should be transferred back to cover the non-oil structural budget deficit on the government budget. The expected real return was estimated to 4 percent.

This implies that in the budget process in October every year, the Ministry of Finance makes an estimate for the value of the Pension Fund at the beginning of the budget year which starts January 1st. The estimated real return is 4 percent of this value, and it is this amount that can be used to cover the non-oil structural deficit in the government budget, i.e. the budget balance excluding oil related revenues and expenditures, and with cyclical adjustment of taxes and other parts of the budget.[1]

[1] In the Annual Address in 2012, the central bank governor argued that it is probably too optimistic to expect 4 percent real return, and "that a more robust approach would now be to base fiscal policy on an annual expected real return on the Fund of 3 percent" (Olsen, 2012). However, this recommendation has not been followed by the government.

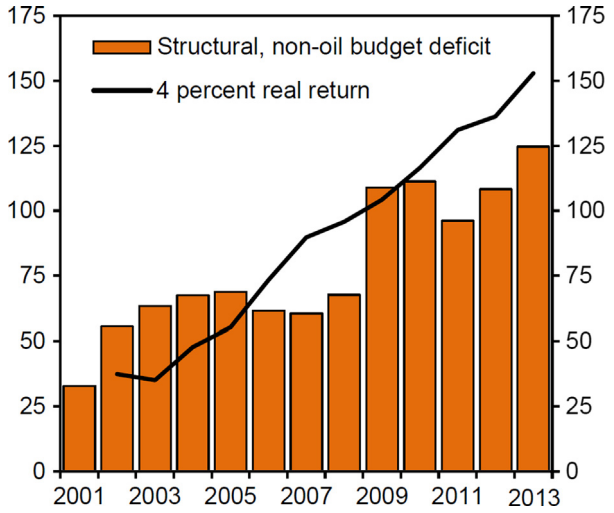

Fig. 6. Government spending of oil revenues as measured by the structural, non-oil budget deficit, and the expected real return of the Pension Fund in bn 2013-kroner.
Source: Revised National Budget 2013

The reason for letting the money from the Pension Fund cover the structural budget deficit rather than the actual budget deficit is to avoid that fiscal policy is procyclical. To understand why, consider the alternative rule where it is the actual non-oil budget deficit that is supposed to be equal to the expected real return from the Pension Fund. In a boom, high levels of employment and output lead to large tax revenues and a small budget deficit. If the actual budget deficit were to be equal to the expected return from the Pension Fund, one would have to increase spending or cut taxes so as to increase the budget deficit, which would amplify the booming economy. 2007 is a case in point. Due to a booming economy, the non-oil budget was in fact in balance, so in reality, the government spent essentially no oil money. Yet in the way it is measured and presented in policy documents, with the non-oil structural budget deficit (see Fig. 6), it would seem that the spending of oil money was almost 75 billion kroner, or more than 3 percent of GDP.

Over the cycle, the accumulated structural deficit is essentially equal to the accumulated actual deficit, implying that this part of the fiscal rule does not affect the spending of oil revenues in the long run, but only the timing of the spending over the cycle.

The fiscal rule also implies that the spending of oil revenues gradually increases along with the increase in the value of the Pension Fund. This is illustrated in Fig. 6, which shows the expected real return from the Pension Fund as well as the spending of oil revenues, as calculated by the structural budget deficit. We observe that while the government spent somewhat more than the 4-percent rule indicated in the period 2002–2005, and also in 2009 – in both periods when the economy was in a downturn – the spending of oil revenues was below the 4-percent rule in 2006–2008, and also in 2011–2013.

While the fiscal rule has received broad political support, there is more debate on whether the rule also includes guidelines for how the money should be spent. In the White Paper presenting the rule (St.meld. 29, 2000–2001), it was stated that the money in part should be spent to stimulate economic growth in the Norwegian economy. Subsequent governments have not made any explicit such arrangements, and some economists and conservative politicians have argued that the money for the most part is spent on consumption and welfare issues, in contrast to the aim of the White Paper. Cappelen (2011) argues that it is difficult to determine which types of public spending will contribute to economic growth, and that the spending on gross investment

and research have grown considerably relative to total public spending. While public expenditure increased considerably up till 1990, from 45 percent of mainland GDP in 1978 to 52 percent in 1990, it has been fairly stable since then, with 52 percent also in 2011 (Finansdepartementet, 2013). Taxes increased somewhat up till around 2000, from 45 percent of mainland GDP in the early 1990s to 48 percent around 2000, for then to fall below 46 percent in 2013 (National budget, 2013). Thus, the oil revenues have been used both to reduce taxes and to allow government expenditure to grow at the rate of GDP, at a high level.

7. The effect on the Norwegian economy

As noted above, the Norwegian parliament from the very beginning had the ambition that the petroleum sector should contribute to the strength of the Norwegian economy. It was a clear goal that Norwegian companies should take part and conduct key roles in the operation. On the other hand, it was also clear that this required sufficient competence and qualifications, as the costs and risks associated with giving key roles to under-qualified companies were not tolerated. This difficult balance was achieved by letting the international oil companies lead in the beginning, while at the same time ensuring government control and Norwegian participation. In this process, the Norwegian firms benefitted from competence in related areas, like shipbuilding and geological expertise. Also prior to the oil production, a large part of Norwegian firms in the manufacturing sector and other sectors were able to compete at the world market. Over time, Norwegian companies have assumed a larger role, both in the actual exploitation and in the provision of inputs.

The petroleum sector is a very capital intensive sector, so that the employment in the actual production sector is small, less than 2 percent of total employment in Norway. However, the petroleum sector is more important when it comes to demand for investment goods and other inputs. In 2012, the demand from the Petroleum sector constituted about 12 percent of the GDP in Norway. About 8 percent of Norwegian employment is directly or indirectly associated with the demand from the petroleum activities (Eika et al., 2010). In particular the investment demand exhibits large fluctuations, and it is for this reason also a source of fluctuations to the mainland economy.

8. Lessons for other countries

To what extent can the Norwegian experience be copied by other countries? This is hard to assess, in particular when it comes to countries in an entirely different political and economic phase of development. When oil was discovered in Norway, the country had been a stable democracy since it acquired independence in 1905. The state bureaucracy functioned well, with little corruption. The legal system worked well, and the media was actively evaluating and commenting upon the workings of the system.

One important factor is how the Norwegian government ensured that the bulk of the oil revenues was reaped by the state. Taxation is heavy, with 78 percent tax, reflecting the high profitability in the extraction of petroleum resources. Yet the tax system was also seen as stable and transparent, implying that international oil companies have always seen the Norwegian sector as attractive for business purposes. And, as noted above, when the oil price fell in 1986, the tax rates were reduced somewhat to ensure that the sector remained profitable for the oil companies. Additional revenues are ensured for the state by the fact that the government assumes a passive ownership share in all fields, via the SDFI. This is also a design that ensures that Norway reaps an important part of the revenues, while still providing the oil companies with profitability and incentives to ensure that they participate and make rational investment and production decisions.

Norway has used a host of different measures to ensure participation by Norwegian companies in the petroleum activities. This involves the risk that less competent domestic companies make erroneous decisions, leading to less profits and higher risk of large accidents. Thus, it is important than domestic companies are not given a role that exceeds their qualifications. Furthermore, the licensing system must be fair, transparent and free of corruption.

The Norwegian experience suggests that the benefit of the petroleum activities to the overall economy increases over time. This might indicate that one should aim for a long duration of the production phase. Oil companies have high required rates of return, and their investment horizon is surely much shorter than what is advisable for a country.[2] The Norwegian experience is that when oil reserves are discovered, the pressure from oil companies, local politicians and unions expecting to benefit from the oil production will be strong, making it politically virtually impossible to prevent rapid production. Thus, if one aims to prolong the production phase, explorations should be delayed, to delay the discovery of some of the resources.

The spending of oil revenues has increased gradually since year 2000, as shown by Fig. 6 above. This involves several benefits. First, it probably implies that the money is spent in a better way, as one gradually comes up with new activities that needs financing. Second, it provides more time for Norwegian firms to adapt to the effects of the increased spending. The cost level has increased considerably in Norway over the last decades, as compared to other countries. There is strong reason to believe that the weakened international competitiveness is linked to increased petroleum activities and increased spending of oil revenues, which pushes up demand for domestic resources, leading to higher wages and prices. If the spending of oil revenues had increased faster, the increase in the cost level is also likely to have been faster, increasing the risk of Dutch Disease.

So far, Norway has been able to save a large share of the petroleum revenues. If followed, the fiscal rule implemented in 2001 will ensure that the spending of the oil revenues will last forever, to the benefit of both current and future generations. When the direct revenues from petroleum production diminish in the future, this will be compensated by the return from the Pension Fund. However, the return from the Fund cannot compensate for the reduction in domestic demand for input to the petroleum sector. In that sense, the gradual increase over time in deliveries to the petroleum sector in Norway has made the Norwegian economy more vulnerable to the reduction in petroleum activity which inevitably will come.

A crucial point concerns the link between the oil revenues that accrue to the government, and the spending of these revenues. Many oil-rich countries, like Venezuela and Nigeria, and to some extent also Norway, have experienced boom-bust cycles induced by fluctuations in the oil price: High oil price leads to increased investment and petroleum activities, which stimulate the economy, while a fall in the oil price leads to a corresponding contraction of the economy. If the spending of oil revenues is also linked to the contemporaneous oil revenues, this will amplify the boom-bust cycle. In the Norwegian fiscal rule, the spending of oil

[2] There are several reasons why one would expect private oil companies to have higher discount rates than what is optimal for the society. One reason is that the remuneration system of the executives may induce a focus on short run profits. Another is that, as seen from the company's point of view, there might be considerable political risk related to changes in regulation and tax policies, leading to a higher required expected return.

revenues depends on the size of the Pension Fund at the beginning of the year, implying that there is no direct link between oil revenues and spending within the same year. This feature serves an important role in reducing the risk that economic fluctuations induced by variation in the oil price and in the activity in the oil sector are amplified by variation in the spending of the oil revenues. However, over time, the link will unavoidably be stronger. High oil revenues feed into an increasing Pension Fund, and in the subsequent year, public spending may be increased (or taxes reduced) corresponding to 4 percent of the increase in the Pension Fund.

The petroleum wealth is invested abroad, via the Pension Fund. While there has been broad support for this among the political parties and economic experts, there has also been opposing voices from firms, capital institutions and individual politicians, arguing that part of the money should rather be used for domestic investments. However, economists defending the current system have argued that Norwegian firms have access to national and international capital markets, so profitable investments have sufficient funding (see e.g. the report from the expert commission headed by Agnar Sandmo, Finansdepartementet (2004)). The same economists also generally argue that public investments can be financed over the ordinary budgets. If part of the Pension Fund were to be invested in Norway, it would lead to increased domestic demand, which would push up the Norwegian cost level, leading to a larger loss of the traded sector. In effect, the Dutch Disease might emerge. When the petroleum resources diminish, we would have less foreign assets and thus less return in foreign currency, which might require a harsh domestic policy to avoid a deficit on the current account.

However, for a developing country, the choice of where to invest the money might well be different. In many developing countries, shortage of capital may prevent profitable and important investments in infrastructure and new firms. While a large part of the wealth should probably still be invested abroad to ensure return in foreign currency in the future, to pay for imports when petroleum exports diminish, one could also argue that part of the petroleum revenues might be used for important domestic investments. Yet it is clear that this is a risky strategy. There would be strong lobbyism and political pressure to invest in prestigious projects, or projects giving rents to domestic politicians, businessmen or worker groups. Thus, if one were to open up for limited domestic investments, one would need to take even more care that this is done in a diligent and transparent manner.

Appendix A. The 10 oil commandments

The parliament (Stortinget) unanimously adopted the following 10 basic principles in June 1972:

1 National supervision and control must be ensured for all operations on the NCS.
2 Petroleum discoveries must be exploited in a way which makes Norway as independent as possible of others for its supplies of crude oil.
3 New industry will be developed on the basis of petroleum.
4 The development of an oil industry must take necessary account of existing industrial activities and the protection of nature and the environment.
5 Flaring of exploitable gas on the NCS must not be accepted except during brief periods of testing.
6 Petroleum from the NCS must as a general rule be landed in Norway, except in those cases where socio-political considerations dictate a different solution.
7 The state must become involved at all appropriate levels and contribute to a coordination of Norwegian interests in Norway's petroleum industry as well as the creation of an integrated oil community which sets its sights both nationally and internationally.
8 A state oil company will be established which can look after the government's commercial interests and pursue appropriate collaboration with domestic and foreign oil interests.
9 A pattern of activities must be selected north of the 62nd parallel which reflects the special socio-political conditions prevailing in that part of the country.
10 Large Norwegian petroleum discoveries could present new tasks for Norway's foreign policy.

References

Bjerkholt, O, Olsen, Ø., Strøm, S., 1990. Olje-og gassøkonomi. Universitetsforlaget, Oslo.

Bjørnland, H.C. og L. A. Thorsrud 2013. Boom or Gloom? Examining the Dutch Disease in a Two-speed Economy. CAMP Working Paper 6/2013.

Cappelen, Å. 2011. Petroleumsfond og handlingsregel for finanspolitikken. I Finansråd i utfordrende tider. N. Bjerkedal et al. (Eds.). Finansdepartementet.

Corden, W.M., Neary, J.P., 1982. Booming sector and de-industrialisation in a small open economy. The Economic Journal 92, 825–848.

Eika, T., Prestmo, J., Tveter, E., 2010. Etterspørselen fra petroleumsvirksomheten. Økonomiske Analyser 3, 30–39.

Finansdepartementet 2004: Kapitaltilgang og økonomisk utvikling (Sandmo-utvalget).

Finansdepartementet 2013. Perspektivmeldingen. St.meld. 12 (2012–2013).

Gjedrem, S. 2011. Statens pensjonsfond utland: Bakgrunn og noen utviklingstrekk. I Finansråd i utfordrende tider. N. Bjerkedal et al. (Eds.). Finansdepartementet.

Mehlum, H., Moene, K., Torvik, R., 2006. Institutions and the resource curse. Economic Journal 116, 1–20.

Mehlum, H., Moene, K., Torvik, R., 2008. Mineral Rents and Social Development in Norway. University of Oslo, Mimeo.

Mideksa, T., 2013. The economic impact of natural resources. Journal of Environmental Economics and Management 65 (2), 277–289.

National Budget 2013. The Ministry of Finance.

Olsen, Ø. 2012. Economic Perspectives. Address by Governor Øystein Olsen to the Supervisory Council of Norges Bank, 16 February.

Olsen, Ø, 2013. Monetary Policy and Wealth Management in a Small Petroleum Economy, by the Governor Øystein Olsen, Speech 9 April. Harvard Kennedy School, Cambridge, MA.

Norwegian Petroleum Directorate 2013. Facts 2013 ⟨http://www.npd.no/en/Publications/Facts/Facts-2013/⟩.

NOU 1983:27 Petroleumsvirksomhetens framtid (Tempoutvalget).

NOU 2013:7. Grunnlaget for inntektsoppgjørene 2013.

Phillips, J.P.T., 2008. Collecting Rent: A Comparative Analysis of Oil and Gas Fiscal Policy Regimes in Alberta. University of British Columbia, Canada and Norway. Mimeo.

Sachs, J. D., Warner, A. M. 1995. Natural Resource Abundance and Economic Growth NBER Working Paper No. 5398.

Slyngstad, Y. 2013. Management of the Government Pension Fund Global (GPFG). Introductory Statement Before the Storting's Standing Committee on Finance and Economic Affairs 30 April. ⟨http://www.norges-bank.no/en/about/published/speeches/2013/yngve-slyngstad-gpfg/⟩.