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## **The good oil. State roles in the Norwegian petroleum sector**

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Oil and gas have been produced on the Norwegian continental shelf since 1971. Exploration rates, extraction rates, employment, expertise levels, exports of oil and gas have all increased many fold during 1971-2013. The State has several roles in the Norwegian petroleum sector including basic research provider, allocator of exploration rights, investor, infrastructure owner, taxation collector, Sovereign Wealth Fund owner. In this paper I review the development of the petroleum sector in Norway, and highlight the various roles of the State in the development of the sector. The paper provides an overview of the macroeconomic importance of oil and gas in the Norwegian economy and critiques selected petroleum related policies.

Keywords: petroleum sector, oil and gas, Norway, State roles, policy

JEL categories: Q32, Q38, Q43

### **Introduction**

Norway is a mid-sized high latitude country with just five million inhabitants. It has plentiful hydro power, a very long coastline, and a large continental shelf that contains oil and gas. Oil and gas have been produced from the Norwegian Continental Shelf for over forty years. In 2011 Norway was the fourteenth largest oil producer (and seventh largest exporter) and the seventh largest gas producer (and third largest exporter) in the world. The Norwegian petroleum sector is relatively large, innovative, profitable, and produced 52 percent of Norwegian exports in 2012 (Norwegian Ministry of Petroleum and Energy, and Norwegian Petroleum Directorate, henceforth NMPE and NPD). Norwegian firms are world leaders in

undersea production technologies. The State has multiple roles in the petroleum sector including resource owner, legislator, licensor, regulator, investor, commercial operator, taxation collector. During the period 1970-2012 the Norwegian Gross Domestic Product measured at constant 2005 prices has grown at an average rate of three percent per annum. Norway has very high per capita income, a very low Gini Coefficient for income and amongst the highest levels of wealth per capita in the world. This paper examines the roles of the State in the Norwegian petroleum sector and its contribution to the substantial growth in incomes and wealth that Norway has achieved during the last forty years.

Norway is not unusual in having a State petroleum company. The petroleum sector globally is now dominated by state owned companies who own or control over 90 percent of the world's reserves of oil and natural gas (Economist 2013). But with the exception of PEMEX the fifty largest oil firms have their headquarters outside the OECD. The large role of the Norwegian State in the petroleum sector is unusual amongst high income OECD countries most of whom rely upon the private sector or other nations' State petroleum companies to produce petroleum products from their oil and gas fields. High income OECD countries with the exception of Norway use a mixture of subsidies, taxes, royalties, opening regimes to influence activity levels in their petroleum sector and to collect some economic rent generated by petroleum production.

International comparisons of the percentage take by governments from oil and gas production show that Norway has amongst the highest percentage takes in the world (Agalliu 2011, Fraser Institute 2012, Mintz and Chen 2012). State revenues from the petroleum sector are invested in the Government Pension Fund Global (GPFG). The fund is referred to as The Oil Fund (or Oljefondet). The GPFG is the world's largest sovereign wealth fund holding about one percent of the world's equities.

Is Norway lucky because it has a lot of oil and gas which can be readily produced and exported, or is the prosperous and admired Norwegian oil and gas sector the

outcome of astute decisions and policy choices in the petroleum sector including direct involvement in the sector by the Norwegian State? The next section of the paper provides a brief overview of the Norwegian petroleum resource and its development over the past forty years. In the third section the main policies the Norwegian State applies in the petroleum sector are outlined. Section four provides an overview of the roles of the Storting and various State institutions that are important in the petroleum sector. The fifth section explains the main sources of revenue to the State from Petroleum sector activities. Section six critiques Norwegian State roles in the petroleum sector and petroleum sector policies in force in Norway. It assesses the risks and rewards associated with those roles and policies and makes some comments about possible alternative policies. Section seven concludes.

### **The Resource**

All Norwegian petroleum resources have been found offshore in areas that are covered by sedimentary rocks. The total Norwegian marine area (continental shelf) is 2 140 000 km<sup>2</sup>. For comparison the Australian marine area is 6 million m<sup>2</sup> and the New Zealand marine area 5.7 million m<sup>2</sup> (Cook, 2010). About half of the Norwegian marine area is covered in sedimentary rocks that could contain petroleum.

Knowledge about the Norwegian continental shelf has greatly increased during the last fifty years as a result of sustained geological research and over forty years of oil and gas production from the shelf. Geological knowledge about the Norwegian continental shelf was slight in 1958. The UN conference on the Law of the Sea opened in Geneva on 24 February 1958. Norway already had large shipping and fishing interests, but it was not obvious whether the seas around Norway contained other valuable resources. Five days before the Law of the Sea opened the Norwegian Foreign Ministry asked the Geological Survey of Norway (NGU) to assess the prospects for finding minerals on the Norwegian continental shelf. The NGU response was unambiguous: 'The chances of finding, coals, oil or sulphur on the continental shelf off the Norwegian coast can be discounted.'

However, the 1959 discovery of a giant gas field located in Groningen province in the

northeastern Netherlands changed attitudes about the likelihood of discovering petroleum under the sea off Norway. Groningen is the largest natural gas field in Europe and the tenth-largest in the world. Sixty percent of the reserves in the field have been extracted since 1963 (around 1,700 billion cubic meters) and the remaining 40 percent (1,100 billion cubic meters) are expected to last for another 50 years.

In October 1962 Philips Petroleum sent a letter to Norwegian authorities requesting permission to explore for petroleum in the North Sea (NMPE and NPD, 2013). Philips Petroleum sought a license for the parts of the North Sea on the Norwegian continental shelf and offered US\$160,000 per month for the right to explore. The offer was seen as an attempt to gain an exclusive right to explore. It was declined and in May 1963 the Norwegian government proclaimed sovereignty over the Norwegian continental shelf. New Norwegian legislation stated that the State was the owner of resources on the continental shelf and only the Government could issue licenses for exploration and subsequent production. Negotiation with neighbouring countries, particularly Denmark and the UK, agreed in March 1965 on application of the median line principle and the limits of each countries continental shelf in the North Sea. The first licensing round for exploration on the Norwegian shelf was announced in April 1965 and 22 licenses were awarded.

Acquisition of seismic data in Norway started in 1962 and the first exploration well was drilled in 1966. After 200 unsuccessful exploration wells in the North Sea, the 1969 discovery of oil by Philips Petroleum in the Norwegian sector at Ekofisk proved the existence of large oil deposits on the Norwegian continental shelf. Production from Ekofisk began on 15 June 1971. A number of large, commercial discoveries were made during the 1970s, including Statfjord, thus establishing the foundation for the Norwegian petroleum industry (White Paper 2011, p.20). In 1979 the first of the three large concrete platforms on Statfjord came on stream, with US oil company Mobil as operator until Statoil took over that role in 1987. Statfjord was called the “jewel in the crown” of the Norwegian oil adventure. It is the world’s

largest offshore oil discovery (<http://www.norskoljeoggass.no/en/Facts/Petroleum-history/>).

Since 1971 when production began from the Norwegian continental shelf, petroleum has been produced from 88 fields. Six new fields commenced production in 2012. In January 2013, 61 fields were in production in the North Sea, 14 in the Norwegian Sea and one in the Barents Sea. The ratio of fields in production in each of the three seas is closely linked to the sequence in which areas were opened for exploration, first in the North Sea near the boundaries with Denmark and the UK and gradually moving northward (NMPE and NPD, 2013). Recovery rates have increased markedly since 1971 when 17 percent was expected from Ekofisk. In 2013 after a series of new technologies and investments the expected recovery rate is over 50 percent and Ekofisk will continue producing for another forty years.

While some key areas of sea of the Norwegian coast have been reserved (including west of Lofoten), much of the North Sea, Norwegian Sea and southern Barents Sea have been opened for petroleum exploration and production. As of 2011 the total open area was 523 800 km<sup>2</sup>, about half of the total area where oil and gas can be expected to be found (White Paper 2011, p.99).

The Norwegian Petroleum Directorate estimate that total discovered and undiscovered petroleum resources in the Norwegian Continental shelf are approximately 13.6 billion standard cubic metres of oil equivalents. By 2013 6 billion Sm<sup>3</sup> oe had been produced, sold and delivered (NMPE and NPD, 2013). The balance of 7.6 billion Sm<sup>3</sup> oe is split between 5 billion Sm<sup>3</sup> oe that has already been discovered. For the areas where there is sufficient data to make an estimate the Norwegian Petroleum Directorate (NPD) estimated the expected undiscovered resources in both opened and unopened areas to be 2 570 million scm o.e. Two recently opened areas, around Jan Mayen and near the demarcation line with Russia in the Barents Sea, are too new to allow estimation of their expected reserves. The expected undiscovered resources are distributed between the three marine areas with 33 per cent expected in the North Sea, 30 per cent in the Norwegian Sea and 37

per cent in the Barents Sea. (White Paper 2011, p.80).

At the beginning of 2011, there were 100 undeveloped discoveries on the Norwegian Shelf. These discoveries are quite diverse in size, from very small discoveries to larger discoveries containing up to 40 million scm o.e. (White Paper 2011, p.19). The overall resource estimate for these was 700 million scm o.e., which is about 15 per cent of the remaining proven resources. (White Paper 2011, p.72). Twentysix exploration wells were drilled in 2012. Thirteen new discoveries were made adding an initial estimate of 132 million scm o.e to Norwegian petroleum resources.

Oil production from the Norwegian Continental shelf peaked in 2000 at 181.2 million scm o.e. Gas production is expected to peak around 2020. At that time, annual gas production is estimated at between 105 and 130 billion scm o.e. Total production (oil, gas, condensate and NGL) peaked at 263.4 million scm o.e in 2004.

### **Petroleum Policies**

A Norwegian Standing Committee on Industry submitted a White Paper to Storting (Parliament) on 14 June 1971 stating what was needed to ensure that development of petroleum resources in Norway would 'benefit the entire nation'. Included in the White Paper is a declaration of 10 principles that should underpin Norwegian oil policy. These principles have subsequently been dubbed the 10 Oil Commandments.

- 1. That national supervision and control of all activity on the Norwegian Continental Shelf must be ensured.*
- 2. That the petroleum discoveries must be exploited in a manner designed to ensure maximum independence for Norway in terms of reliance on others for supply of crude oil.*
- 3. That new business activity must be developed, based on petroleum.*
- 4. That the development of an oil industry must take place with necessary consideration for existing commercial activity, as well as protection of nature and the environment.*
- 5. That flaring of exploitable gas on the Norwegian Continental Shelf must only be allowed in limited test periods.*

6. *That petroleum from the Norwegian Continental Shelf must, as a main rule, be landed in Norway, with the exception of special cases in which socio-political considerations warrant a different solution.*
7. *That the State involves itself at all reasonable levels, contributes to coordinating Norwegian interests within the Norwegian petroleum industry, and to developing an integrated Norwegian oil community with both national and international objectives.*
8. *That a state-owned oil company be established to safeguard the State's commercial interests, and to pursue expedient cooperation with domestic and foreign oil stakeholders.*
9. *That an activity plan must be adopted for the area north of the 62nd parallel which satisfies the unique socio-political factors associated with that part of the country.*
10. *That Norwegian petroleum discoveries could present new tasks to Norway's foreign policy.* (Meld. St. 28 (2010–2011) Report to the Storting (White Paper)).

These principles have been interpreted and applied to varying degrees in the 42 years since they were first presented. Divergence is arguably greatest with principle 6 whereby some oil is refined in Norway and some gas processed onshore, but much of the oil and 99 percent of all gas is exported (Underthun et al. 2011).

Norway quickly introduced a three pronged approach to development of its petroleum resources separating policy (Ministry of Petroleum and Energy) from regulation (Norwegian Petroleum Directorate, and Petroleum Safety Authority Norway) and commercial production (Statoil and other firms). In 2011 the Ministry of Petroleum and Energy White Paper stated current State objectives (p.6) *'The primary objective of the petroleum policy is to facilitate profitable production of oil and gas in a long-term perspective. The petroleum resources should also contribute to improving the quality of life in Norway in the years to come.'*

Exploration and production of petroleum in Norway is guided by the Petroleum Act (Act of 29 November 1996 No. 72) and regulations to the Act (Regulations of 27 June 1997 No. 653). The Petroleum Act states that property rights to petroleum deposits on the Norwegian continental shelf are held by the State. Firms wishing to explore



and produce on the Norwegian continental shelf need to apply to the State for official approval and permits for each phase of their activities: acquiring seismic data, exploration drilling, development and production operations, and cessation of production from each field. Norway imposes tight control over the areas where petroleum activities are permitted. Before any petroleum activity is permitted an impact assessment is completed for an area under consideration. Impact assessments evaluate economic and social effects and environmental impacts expected if petroleum activities were to commence in an area.

Exploration and production commenced in the southern part of the continental shelf and was confined to the area south of 62 N (North Sea) during the 1970s. Activity was permitted in predefined areas of the Norwegian Sea beginning in 1979 and in the southern Barents Sea in 1979. The most recent additions to permitted activity areas are west of Jan Mayen (in the Norwegian Sea) and in a formerly disputed area near the Russian continental shelf (in the southern Barents Sea).

Norway has two types of licensing systems for activities on the continental shelf. In newer areas licensing rounds are held every two years. Oil companies are asked to propose areas they would like to have included in a licensing round and State authorities determine which will be open for production licenses. In mature areas Norway introduced in 2003 a system of awards in predefined areas (APA) where oil companies can apply annually for exploration and production acreage. Licenses to operate are awarded on the basis of pre-announced criteria and are initial periods up to ten years. Exploration activity is essential to be awarded a license and squatting is actively discouraged by policy. Area fees are charged for the first three years of a license, subject to some exemptions. Firms cannot retain a license for an area if they do not have a plan to commence production, hence allowing surrendered areas to be open to license application by other firms.

Firms that judge it is commercially viable to develop a field must submit a Plan for Development and Operation (PDO) to the Norwegian Petroleum Directorate. The PDO must include an impact assessment that states the expected impact of

development and operation of the field on the environment, fisheries and society in general (NMPE and NPD, 2013).

A decommissioning plan must be submitted by the lead operating firm for a production facility to the Ministry of Petroleum and Energy, two to five years before cessation of production, or before relinquishment or expiry of a license. The plan must include an environmental impact assessment and a disposal section. The Oslo Paris Convention for the protection of the North East Atlantic allows only a small number of facilities to be abandoned on site.

The Petroleum Act 1996 specifies that licensees are responsible for pollution damage under a policy of strict liability. Since production began on the Norwegian Continental Shelf in 1971, no discharges to sea from petroleum production have reached the coastline. Total acute discharges to sea during 2011 totaled 19m<sup>3</sup> (NMMPE and NPD 2013)

The Extractive Industries Transparency Initiative (EITI) is an initiative directed to good financial management by disclosing and reconciling revenue flows to the State from oil, gas and mining companies in natural resource rich countries. The belief is that citizens will be better able to hold their governments responsible for good financial management if they have transparent, accurate information on natural resource revenue flows. Norway is the only OECD nation that is a member (and compliant) within EITI.

### **State institutions and petroleum activities**

The Storting (Norwegian Parliament) provides the guiding principles for petroleum activities in Norway by debating and approving legislation and by parliamentary deliberation on major issues such as the opening of potential new production areas and major development projects. Executive actions of the Government are supervised by the Storting. Government policies are implemented by way of several Ministries, Directorates and supervisory authorities. The State has played a facilitation role to shape petroleum policy via a grouping called Konkraft. Quarterly

meetings between oil industry representatives and politicians, chaired by the Minister of Petroleum and Energy helped shape policy including whether to open areas for exploration where fishing is important (Kristoffersen and Young 2009).

The Ministry of Petroleum and Energy is the government agency responsible for management of Norway's petroleum resources. It ensures that petroleum activities occur in accord with the guidelines set by the Storting and the Government. MPE has ownership responsibilities for two state owned companies Petoro AS and Gassco AS and for the 67 percent State owned Statoil AS.

The Norwegian Petroleum Directorate reports to the MPE and is an important advisor for the MPE. The NPD has administrative authority for exploration, and production on the Norwegian continental shelf. It stipulates the regulations that apply and makes decisions applying those regulations.

A State owned oil company Den norske stats oljeselskap a.s (Statoil) was established in 1972, and the Storting decided that the State would have a 50 per cent holding in each production licence on the Norwegian Continental shelf. Parliament later resolved that this proportion could be increased or reduced on the basis of an assessment in each case (<http://www.norskoljeoggass.no/en/Facts/Petroleum-history/>). Statoil has played a major role in the development of Norwegian petroleum expertise through its involvement in exploration, production, transport, retail. Statoil was listed on the stock exchange in 2001 and in 2007 it merged with the oil and gas divisions of another large partly State-owned company Norsk Hydro. In 2013 the State owns 67 percent of Statoil and it is listed in Oslo and New York and operates in 35 countries.

Petoro AS is the State-owned institution that manages the State's direct financial interest in the petroleum sector, including Statoil. Gassco AS is a State-owned enterprise with responsibility for the transport of gas from the Norwegian continental shelf to onshore sites in Norway or to markets in Western Europe.

Gassco operates the firm Gassled which is 46 percent State owned. Gassled owns 7800 km of pipelines that deliver gas to four destinations to Norway, Germany, Netherlands, France and the UK.

The Ministry of Finance is responsible for ensuring that the State collects taxes and fees from petroleum activities including, corporate taxes, special taxes, area fees, CO<sub>2</sub> and NO<sub>x</sub> taxes. The tasks of levying and collection are handled by a dedicated unit the Petroleum Tax Office which reports to the Ministry of Finance. The Ministry of Finance is responsible for managing the Government Pension Fund Global but has delegated operational management of the GPFG to Norges Bank (the Central Bank).

The Norwegian Ministry for the Environment, Ministry of Labour, and Ministry of Fisheries and Coastal Affairs each have specific responsibilities that regulate and impact activities in the Norwegian petroleum sector.

### **State Revenues from petroleum activities**

Petroleum resources on the continental shelf are owned by Norwegian society. The State has made large investments in many aspects of exploration and production hence contributing to value creation in much of the sector. The State obtains revenue in five ways from the petroleum sector.

Norway taxes company profits at 28 percent and petroleum production firms pay a further special tax of 50 percent on their profits. Calculation of profit is based upon income calculations that may include norm prices set by the Petroleum Price Council if oil sales are to affiliated companies. Profit calculations allow for depreciation on investments (straight line over six years since the year they are incurred), expensing of exploration, R&D and decommissioning, CO<sub>2</sub> and NO<sub>x</sub> taxes and area fees. Before the calculation of the petroleum tax an uplift of 5.5 percent of the firms investment cost is deducted from taxable income for four years to shield normal returns from the special tax. Tax liabilities are assessed for firms, not for petroleum projects. Petroleum firms who make losses can carry forward their deficit and uplift with interest. They can apply for a refund of the tax value of exploration expense at the

time of their tax assessment. In 2011 direct taxes from petroleum firms totaled NOK 204.7 billion.

Area fees are imposed to ensure that firms pursue active programmes of exploration and production on acreage they hold on the continental shelf. Area fees NOK 30 000, 60 000, and 100 000 per square kilometer are charged for years one, two and three of a license. Firms can be exempted the area fee if they have submitted a plan for development and operation (PDO) to the Ministry of Petroleum and Energy, or if there is insufficient infrastructure in the area, or the firm has drilled an additional wildcat well in the area.

Two environmental taxes are imposed on petroleum activities in Norway. Production firms must purchase a quota for all of their CO<sub>2</sub> emissions from activities on the continental shelf. A CO<sub>2</sub> tax was introduced in Norway in 1991 and in 2013 was set at NOK 0.96 per litre of petroleum burned or cubic metre of gas burned or released directly. Norway is obligated to reduce its emissions of nitrous oxide under the Gothenburg protocol of 1999. That protocol led to the introduction in 2007 of the NO<sub>x</sub> tax. It is currently set at NOK 17.01 per kg NO<sub>x</sub> of annual emissions by a firm. Environmental taxes plus area fees and other charges totaled NOK 3.8 billion in 2011.

The Norwegian State is a major investor in the petroleum sector. It holds a share of ownership in many oil and gas fields, pipelines and onshore facilities. State ownership shares are determined at the time of award of production licenses, vary on a case by case basis, and are held by the State-owned management company Petoro. The State had direct financial interests in 158 production licenses, and interests in 15 other pipeline and onshore joint ventures at 1 January 2013. Net cash flow to the State from its direct financial interests totaled NOK 122.7 billion in 2011.

Statoil ASA is a publicly listed petroleum company that operates in 35 countries. The State owns 67 percent of Statoil and receives dividends each year from its petroleum operations, and in 2012 they were NOK 13.88 billion.

Total net cash flow to the Norwegian State from petroleum activities in 2011 were NOK 355.1 billion.

### **A critique of the State role and policies**

The petroleum sector is the largest in the Norwegian economy. In 2012 there were 76 fields in production on the continental shelf which produced about 1.9 million barrels of oil per day and 111 billion standard cubic metres of gas. Norway was the seventh largest exporter of oil in the world and the third largest exporter of gas in 2011. The petroleum sector generated 23 percent of Norway's GDP in 2012, 52 percent of its exports, and provided 30 percent of the State's Revenue (NOK 355.1 billion). Statistics Norway (2010) estimated for 2009 that 206 000 jobs were related to oil and gas activities. In 2012 investment on the Norwegian continental shelf including exploration totaled NOK 175 billion, 29 percent of the national total. The Norwegian supplier industry provides technology, products and services within Norway and abroad with 2011 turnover of NOK 361 billion (NMPE and NPD, 2013). The GPFG which received its first cash transfer in 1996 has grown quickly and is now about 180 percent of Norway's GDP. The market value of the GPFG increased steadily during 2009-2013 to reach NOK 4 922 billion on 9 November 2013 (<http://www.norges-bank.no/en/>). The Norwegian petroleum sector is large, productive, and profitable.

An active and dominant role for the State was envisaged when the ten oil principles were tabled in the Storting in 1971. The Norwegian State, uniquely amongst OECD countries, is today a large player in the petroleum sector as resource owner, legislator, licensor, regulator, commercial operator, tax collector. AUPEC (2009, 107) observe there are several reasons for governments wishing to participate in exploring and producing oil in their own countries, including:

*a) To collect a further share of economic rents for the state above those obtained through royalties, taxes and profit-sharing. The extra which accrues to the state is the National Oil Company (NOC)'s net cash flow after all taxes and other payments.*

*b) To have indigenous (local) ownership of the activity. State participation is one*

*method of increasing the extent of local ownership. But it could also be done through local private sector oil companies.*

*c) For additional state control over the activity, through internal decision making. This motive reflects the view that the oil industry is of such great strategic importance that it should be controlled by the state.*

*d) To provide expert specialist advice to Government. A Government may lack the expertise to deal effectively with the oil companies and the experience of operations (even as a partner) may enhance the competence of the host Government.*

*e) To serve as a vehicle for technology transfer. Host Government may desire the effective transfer of technology to their country. The provision of up-to-date knowhow and technology to a (state) partner company in a consortium is one way by which this can be achieved. It can be achieved in other ways through licence obligations regarding, for example, training obligations, but technology transfer is more difficult.*

Each of those five reasons for State involvement in the petroleum sector seems relevant in Norway. The State obtains considerable revenue from its participation in the oil sector. There is a preference for local ownership of a large share of activity in the sector, much but not all of it State owned. Norway does have considerable State control over strategic developments in the largest sector in the economy. Because the State has a large participant role in the sector it is well informed and well positioned to deal with the petroleum industry. The State's active role in growth and development of the sector was initially as a partner with foreign owned firms who had experience in shallow water offshore exploration and production. Norway developed petroleum expertise within a decade following an 'infant industry' stance and is now a world leader in undersea production technologies and exports products services and expertise to the global petroleum industry.

Given the multiple roles and direct participation of the State in the Norwegian petroleum sector I ask three questions: what cash flows does the State get from current policies and activity in the sector and what risks does the State face; what are development prospects for the sector and how do State policies and participation impact the development prospects; and what long term benefits will Norway receive as a result of State policies and activities in the petroleum sector?

#### *Current returns and risks in State policies and participation*

I use two approaches to gauge return to the State from the petroleum sector. Several recent studies (Mintz and Chen 2012, Agalliu 2011) have calculated the take rate for Norway and compared it with the take rate in other oil and gas producing regions. Take is defined by Agalliu (2010, p.47) as:

$$\text{Government Take} = \left( 1 - \frac{\text{Company After Tax Cash Flow}}{\text{Gross Project Revenue} - \text{OPEX} - \text{CAPEX}} \right) \times 100$$

Take for the State can include royalties, company tax, special taxes, environmental taxes, area fees and other charges levied by the State. Norway does not use royalties but received NOK 214.7 billion taxes from the petroleum sector in 2012. The take rate for Norway has been calculated at 78 percent Mintz and Chen (2012, Table 3), clearly the highest take rate in the fifteen petroleum jurisdictions they study. Agalliu (2011) assessed the take to be 75 percent for oil and 73 percent for gas.

Norway has made very large investments on the continental shelf. What return on State investments does it achieve? Net cash flow from State direct financial interests in petroleum activities were negative during 1985-1988, fluctuated during the 1990s, and have averaged in excess of NOK 105 billion during 2000-2011. At the beginning of 2010 the value of SDFI was calculated to be NOK 865 billion (White Paper 2010 p.166).

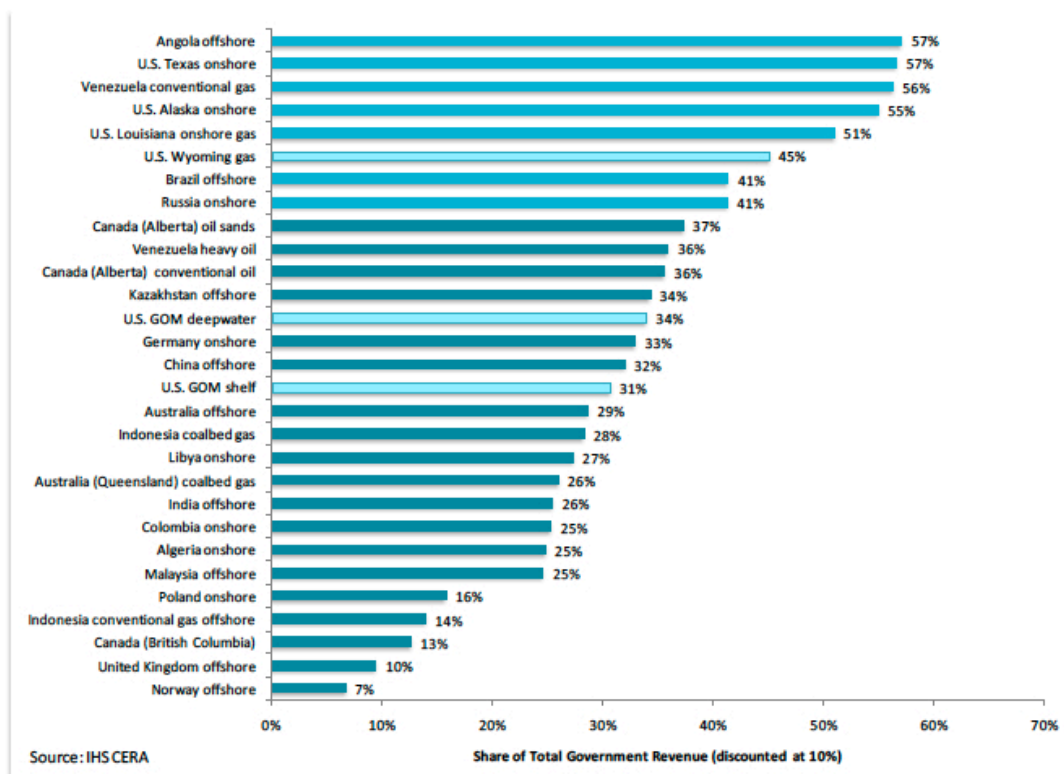
There are almost 8000 km of pipelines in the network carrying gas to four shore facilities in Norway and to six other European destinations. Total investment was estimated at 2010 NOK 280 billion (White Paper 2010, p.67). The returns from the gas transport infrastructure are regulated by the State to ensure that earnings are



extracted on the fields and not in the transport system. ‘Tariffs in newer pipelines are stipulated so the owners can expect real returns of about seven per cent before tax on the total capital’ (White Paper 2010, p.68).

The take for Norway comes from company tax, special tax, and dividends from Statoil and SDFI. These fiscal instruments only capture benefit for Norway after profits are earned by petroleum firms operating on the continental shelf. There are high risks for the State in the approach that is followed. Agalliu (2011, p.111) studied the extent to which governments share in project risk by examining the percentage of total government revenue collected early on in the producing life of oil or gas fields. She ...’compared the revenue accruing to the government when the field reached one quarter of its producing life against the total revenue accruing to the government from each individual project’ (Figure 1) with future returns discounted at 10 percent.

**Figure 1. Share of total Government revenue at one quarter of producing field life (discounted at 10 percent)**

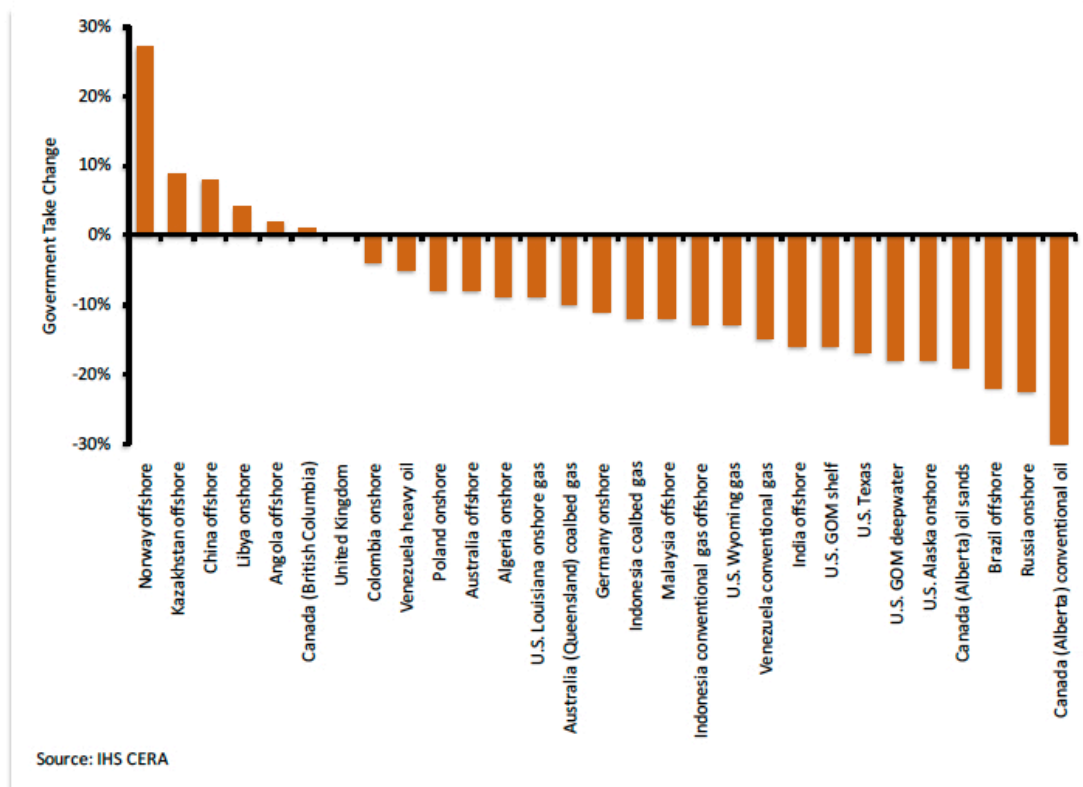


Source: Agalliu 2011, Figure 5.2

The State in Norway is exposed to considerable risk by the reliance on rear-end loaded fiscal capture mechanisms from petroleum projects. However, risk can be associated

with high reward and the Norwegian approach is designed to capture a large percentage of the economic rents generated by successful projects. Agalliu (2011) studies this by modelling the impact on government take as the IRR of projects increases from five percent to 25 percent and found that Norway has the most progressive fiscal capture mechanisms of the jurisdictions she studied (Figure 2). (Regressive approaches, front-end loaded, capture a large share of profits from project of low profitability). Progressive fiscal systems are desirable, but highly progressive fiscal systems are a threat to investors if they capture all of the upside returns. If they are not well designed, they can encourage inefficient resource development and provide little incentive to lower costs Agalliu (2011, p.97). There has been very large cost increase recently in exploration costs on the Norwegian continental shelf (White Paper 2010). Norway allowed firms a 7.5 percent uplift (for four years) for depreciating capital investment including development expenditures. Perhaps in response to the rapid increase in exploration costs the uplift rate was reduced to 5.5 percent on 5 May 2013.

**Figure 2. Degree of change in Government take with 20 percent change in IRR**

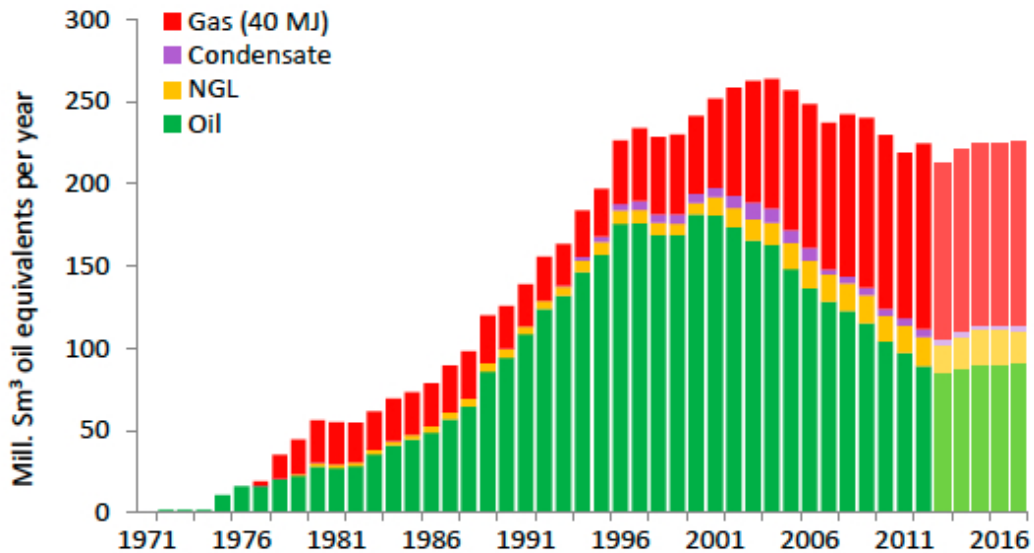


Source: Agalliu, 2011. Figure 4.8

*Incentives for further development*

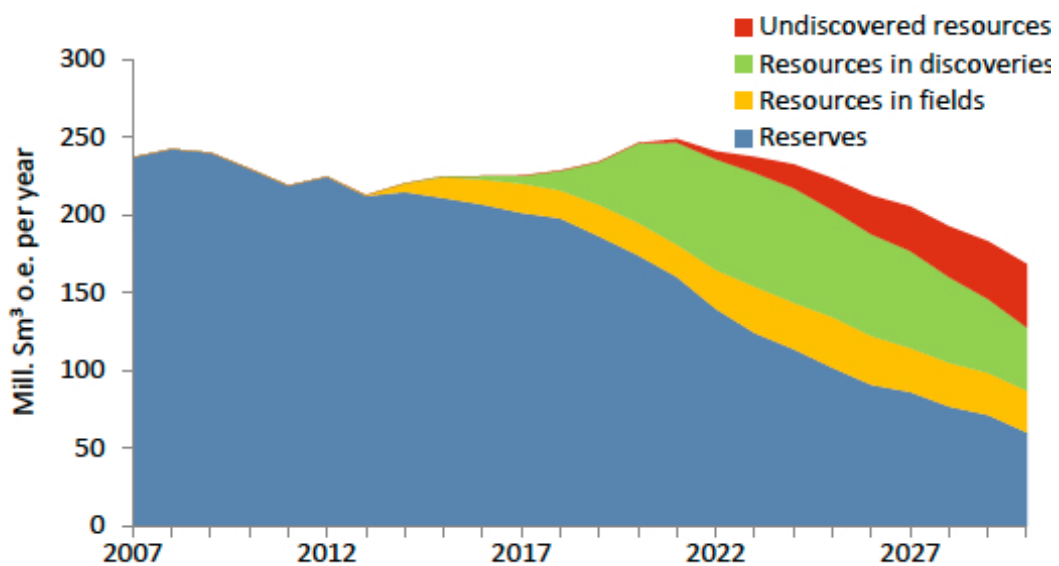
Oil and gas have been produced on the Norwegian continental shelf for over forty years. Are there still strong incentives for exploration and production in Norwegian water? I address that by examining recent trends in exploration, success rates, P/I ratios and the incentives provided by Norwegian petroleum policies. (Figures 3, 4, 5)

**Figure 3. Historical production of oil and gas and prognosis for production in coming years**



Source: Facts 2013 Figure 3.7

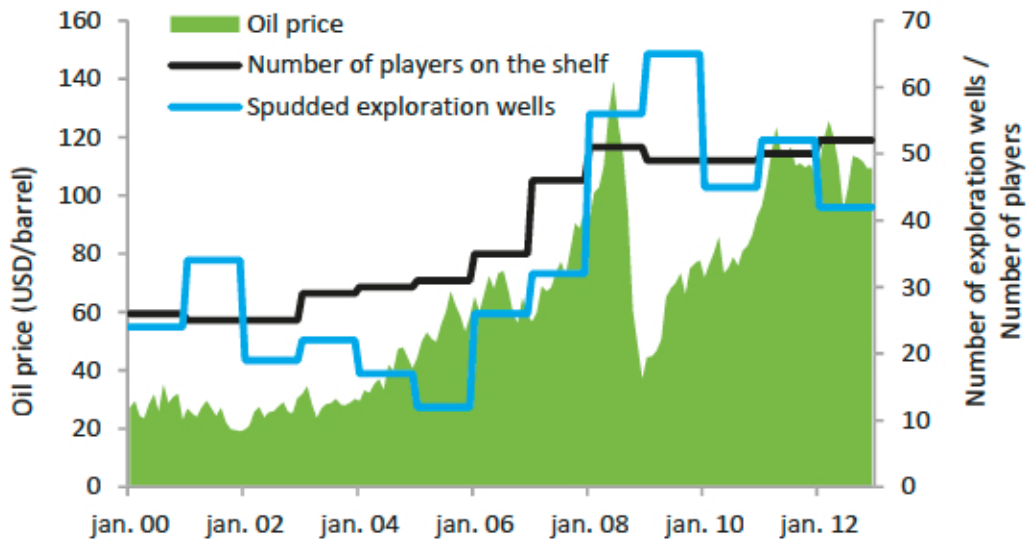
**Figure 4. Production prognosis for oil and gas.**



Source Facts 2013 Figure 3.8

Exploration activity is strong on the Norwegian Continental shelf. NOK 175 billion was invested in exploration in 2012 and 42 exploration wells spudded which resulted in 13 discoveries. Oil reserves and gas reserves are both still increasing on the shelf.

**Figure 5. Rising oil price and more diverse player mix contributes to high exploration activity on NCS**

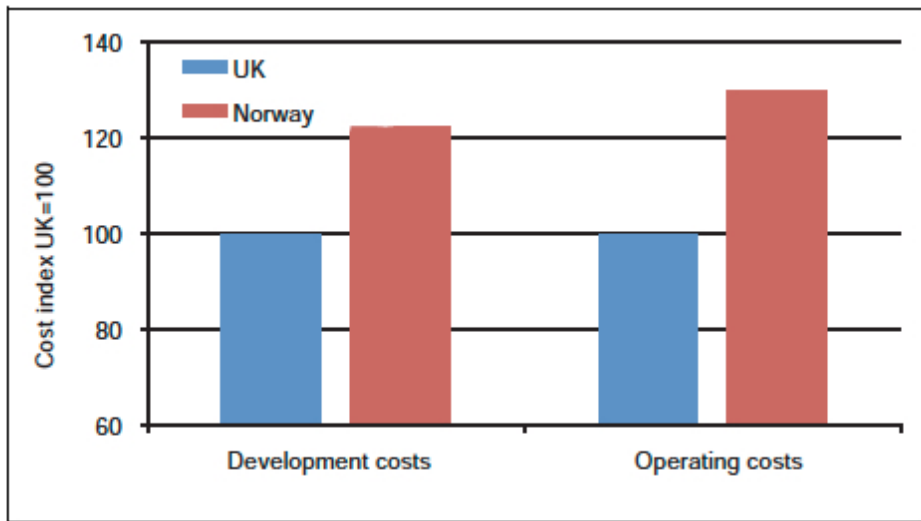


Source: Facts 2013 and Norwegian Petroleum Directorate.

It is argued that the sustained exploration and high levels of production occur because Norway's policies provide... 'a stable and attractive investment environment that yields a reasonable return on investments. Although it is often referred to as an example of high government take, the Norway fiscal system is still very attractive because it is based purely on taxation of profits rather than gross revenue.' (Agalliu 2011, p.83).

There are some areas for concern for Norway. Cost of production is about US\$60 per barrel on the Norwegian continental shelf, and costs have recently increased sharply (White Paper 2010, 26). Exploration costs, production costs and environmental taxes are all higher in Norway than in other areas such as the UK portion of the North Sea (Figure 6).

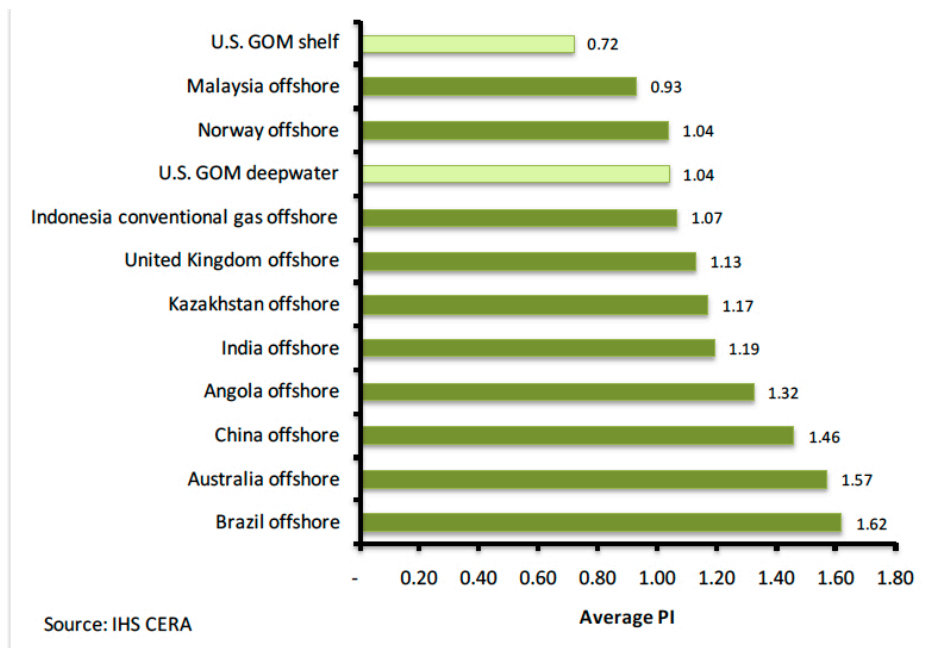
**Figure 6. Development costs and operating costs for fixed platforms and Floating production, storage and offloading facilities, Norway and UK.**



Source: White Paper 2010, 27 (quoting Woods Mackenzie).

Agalliu (2011) models petroleum projects on 153 fields and calculates project profitability ratios including P/I, project profits divided by investment cost (Figure 7). P/I is the ratio of the net present value (NPV) of the project cash flow to the NPV of the total capital invested. For projects on the Norwegian continental shelf Agalliu (2011) calculates a ratio of 1.04, suggesting current investments are moderately profitable.

**Figure. 7 Average PI – Offshore Fiscal Systems**



Source: Agalliu 2011, p.90.

Norwegian petroleum officials are aware of the increasing cost trends, and relatively low P/I ratios. Because the Norwegian State has a multiple, diverse roles in the sector it is very well informed and able to incentivise, cajole, coerce, coordinate firms toward lower exploration costs, lower production costs, and increased recovery rates. Instruments available to the State include alteration to uplift rates and special taxes rates, controlled opening of new exploration areas, unitisation of small resources, sequencing of production to optimise use of pipelines and onshore facilities, ability to support capability growth in firms and to increase competition in the sector. The Norwegian regulatory model has recently also been chosen for use on the Icelandic continental shelf (<http://www.petro.no/petoro-annual-report/2012-/about/highlights-2012>).

#### *Long terms impacts of State policies and participation*

The White Paper (2011, p.6) stated ... *'The petroleum resources should also contribute to improving the quality of life in Norway in the years to come.'* Norway recognizes that its petroleum resources are large but finite. Over forty percent to the resources it has or expects to discover have been produced and sold. The Norse petroleum resource may be economically if not physically exhausted within three generations. Norway passed legislation in 1990 to create an 'oil fund' and today has a very large Sovereign Wealth Fund known as the Government Pension Fund Global (GPFG). AUPEC (2009) observe there are several possible motivations for a country to set up a Sovereign wealth funds including: to ensure long term fiscal sustainability, to increase inter generational equity, and to assist macroeconomic stabilization. Arguably the GPFG can or does contribute to all three of those objectives. All revenues to the State from the petroleum sector including dividends from Statoil and SDFI go directly to the GPFG. The first revenues went into the fund in 1996 and it has grown steadily to reach NOK 4800 billion by 4 November 2013.

**Key figures at 30 June 2013. Annualised in international currency**

	Last 12 months	Last 3 years	Last 5 years	Last 10 years	Since 1 Jan 1998
Size in NOK billion	4,397				
Size in USD billion	729				
Total return, including real estate (percent)	14.21	9.16	5.87	5.95	5.25
... of which relative return on equity and fixed-income investments (percentage points)	0.83	0.46	0.28	0.24	0.31
Net real return (percent)	12.18	6.64	4.00	3.61	3.17

Holdings	Equities	Bonds	Real Estate
Size in NOK billion	2,785	1,571	40
Share of total assets (percent)	63.4	35.7	0.9

**Table1. Returns from Government Pension Fund Global**

Source: Factsheet\_GPFG\_2Q\_2013

The GPFG is managed by the central bank (Norges Bank) who are responsible to the Ministry of Finance. The fund is 100 percent invested outside Norway in equities, bonds and real estate. Fiscal policy regulates the outflow from the Fund, and is anchored in the Fiscal Policy Guideline which states that over time the use of petroleum revenues shall correspond to the real return on the Fund, estimated at 4 percent. In recent Budgets less than 4 percent has been drawn annually from the fund to meet the deficits in the State budget. The Norwegian population and economy are both growing in size and there is considerable demand side pressure in the Norwegian economy and for the NOK. By investing all oil revenues outside Norway the Fund alleviates some pressures on Norges markets and on the exchange rate for the NOK.

**Conclusions**

The Norwegian State has played a major role guiding developments in the petroleum sector through direct participation and by way of State policies. Ten principles were tabled before Storting in 1971 to guide State actions and policy on petroleum. The ten principles have generally been followed during the forty two years since 1971. Norway's policies and State participation in the petroleum sector are directed at facilitating profitable production of oil and gas over several generations and ensuring utilization of the petroleum resources enhance inter generational well being in Norway.

Norway has very plentiful hydro power resources and low cost hydro electricity is readily available for industry and households. Norway had strong engineering, ship building, and shipping capabilities in 1971. It lacked petroleum expertise and capability and pursued a pragmatic approach to State participation in the sector, at first heavily reliant on international firms for exploration and production in joint ventures with Norwegian firms (Statoil, Norsk Hydro, Saga). State policies and mode of participation have changed over time as Norway has pursued its principal goals of controlled development and utilization of the resource, growth in Norwegian expertise capability and participation in the sector, and capture of economic rent to sustained contribution to Norwegian wellbeing.

The State maintains a three-pronged approach separating policy from regulation and State participation. Norwegian petroleum policies facilitate rent generation and the State captures a large share of the economic rent from the Norwegian continental shelf. Rent is captured through progressive, profit-based instruments and through extensive direct participation in the multiple parts of the sector. There are several risks associated with those approaches, including the possibility of becoming uncompetitive because of cost increases.

Norway has benefitted greatly from production of oil and gas on the Norwegian continental shelf since 1971. It has taken a long term approach to utilization of the petroleum resource and has developed world leading undersea petroleum expertise capability. Economic benefits from the petroleum resource are distributed widely within current Norwegian society and via the GPFG will contribute to improved Norwegian wellbeing.

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