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ANALYSIS

State participation and taxation in Norwegian petroleum: Lessons for others?

Diderik Lund

Department of Economics, University of Oslo, Blindern, NO-0317 Oslo, Norway

A B S T R A C T

Starting around 1970, Norway's system of state participation and taxation in petroleum had important asymmetries, known as distortionary in tax theory. Moreover, tax rates were tailored to oil price changes. From 1986 onwards this has been reformed gradually into a stable and symmetric system, recognized as close to neutral, inducing companies to maximize pre-tax values. But the system is costly and risky for the state. If countries are unable or unwilling to bear costs and risks, they cannot implement the neutral system. Neither did Norway from the beginning. In that case a country faces important trade-offs between risk and the maximization of pre-tax value or state revenue. This may be partly circumvented by slowing the pace of licensing.

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1. Introduction

A number of authors (e.g., [1—6]) have identified a "Norwegian model" of petroleum sector management, and discussed its possible role as an example for other countries rich in oil or other nonrenewable resources. The lessons to learn typically include the introduction of sector legislation and taxation, transparency, the savings of state revenue in a fund, the establishment of a national oil (or other resource) company and government institutions, and, in particular, the division of tasks between that company and those institutions. A related literature (e.g., [7—9]) has a macroeconomic focus, and asks whether there are lessons to learn from Norway's avoiding the resource curse.

The present case study will discuss the petroleum sector in Norway, but with a somewhat different perspective. I ask whether there are lessons to learn for other nations from the system of state participation and taxation. Particular problems for low-income resource-rich countries will be pointed out, as an application of perspectives found in Ref. [10]. Whether there is anything to learn from Norway's taxation of petroleum is disputed. The International Monetary Fund (IMF) [11] writes that "Norway has perhaps the closest to a pure rent tax [...] coupled with [corporate income tax], for its North Sea oil and gas under a system also noted for its stability" (p. 24). On the other hand, Al-Kasim [1] writes that "The Norwegian fiscal regime does not offer any

feature that could be of particular interest to other host countries" (p. 249). The conclusion below will be more nuanced: Norway should not be copied unconditionally. But the neutrality principle represents a useful benchmark. Other nations should consider carefully what is gained and what is lost by deviating from this principle. Perhaps there is also something to learn from the non-neutrality of the Norwegian system during its first thirty years.

Regarding state participation, I concentrate on the State's Direct Financial Interest (SDFI), and claim that it may be seen as a form of taxation. However, the huge cash flows to and from taxation and state participation have consequences also for other parts of the governance of the sector. In effect, a form of partnership is facilitated.

Section 2 gives a brief historical overview from this perspective. Section 3 relates the history to the concept of neutrality known from economic theory of taxation. Section 4 asks what lessons can be learned on revenue collection, taking into consideration what costs and risks are carried by the state. Section 5 draws lessons from other aspects of Norwegian petroleum, in particular the system for licensing and participation. Section 6 concludes.

2. Historical development

In 2012, Norway was the world's 14th largest oil producer and 6th largest producer of natural gas [12]. With a small population of about 5 million, most production goes to export. Briefly, the history of state participation and taxation in the Norwegian petroleum sector is as

E-mail address: diderik.lund@econ.uio.no.

Table 1
Historical development of some main features of state participation and taxation.

Decade	State participation	Taxes incl. royalties
1960s	1965: State minority holding in Norsk Hydro, with shares in licenses	1965: Corporate income tax (CIT) (41.8%) and Royalty (10%, deductible in other taxes)
1970s	1972: Statoil established, 100% state owned, strongly favored in licensing	1972: Progressive royalty for oil (8—16%) 1975: Special petroleum tax (SPT) (25%) on top of CIT (50.8%) (totaling 75.8%)
1980s	1984: State's Direct Financial Interest (SDFI) (state as non-operating partner) split out from Statoil's license shares	1980: SPT rate increase to 35% (total 85.8%) 1986: SPT rate decrease to 30% (total 80.8%) 1986: Gradual phasing out of royalty started, negative royalty for new fields (15%)
1990s	1992: Statoil's carried interest during exploration abolished 1993: Statoil's sliding scale arrangement abolished in new licenses	1992: CIT reform, reduced to 28%, SPT increased to 50%, totaling 78%, negative royalty abolished
2000s	2001: Statoil partly privatized, Petoro established to take care of SDFI	2002: Loss carry-forward w/interest accumulation, possible sale of final loss position 2005: Direct refund of loss from exploration and of final loss, if any
2010s		2013: Uplift in SPT reduced somewhat

follows. After rejecting an enquiry by Phillips Petroleum in 1962 for exclusive rights to petroleum in the offshore sector of Norway, the government quickly negotiated sector borders with neighboring Denmark and Britain, concluded in 1965. A system for licensing was developed. The development of the system of taxation[1] and state participation is shown in Table 1. Many details are left out. The table concentrates on features that are important for this article.

Throughout the period there has been discretionary licensing based on a set of criteria ("beauty contest"), no auctions, i.e., no cash-bonus bidding. Since the early nineties, these criteria are officially non-discriminatory between foreign and domestic companies, also including Statoil. Almost all licenses have been awarded to groups of companies, typically composed by the authorities, with one as operator. Cooperation in such a partnership is a requirement for participation.

Statoil had a privileged position in Norway in many ways for twenty years after being established in 1972. It received shares in licenses as a deliberate means of developing the company, not based on previous merits. In a specific case, the company Mobil (later ExxonMobil) was required to cooperate and ultimately hand over operatorship to Statoil at the Statfjord field. Then, in the early nineties, two privileges were removed: Statoil had enjoyed carried interest during exploration, meaning that the other licensees paid for exploration, also "Statoil's share." In some licenses Statoil's ownership share had been increased according to a "sliding scale" based on the amount extracted. The removal of these privileges was part of a process to put Statoil on equal footing with other companies, required by Norway's entering into the European Economic Area agreement with the EU.

In the early eighties, Statoil had so large revenues that the state decided it did not want it all to pass through the company. This was agreed as a 1984 compromise between the largest political parties, which ensured a stable arrangement for years thereafter. More than half of Statoil's ownership in licenses and pipelines were taken from Statoil and put under direct state ownership, the SDFI. SDFI acts as a non-operating partner, paying its share of costs, taking its share of revenues. In 2001 Statoil was partly privatized, i.e., listed on the Oslo and New York stock exchanges with 33 percent of shares no longer state owned. At that time the company Petoro was established to take care of the SDFI. This is wholly state owned.

The petroleum tax system has had three main elements, the Corporate income tax (CIT), the Special petroleum tax (SPT), and the

Royalty, which is being phased out. The purpose of the SPT is to channel as large a fraction as possible of the resource rent to the state. This rent is defined as the net value of the resource, which must be understood in a risk-adjusted net present value sense. While the first decades saw tax rate movements correlated with oil price movements, the rates have been quite stable since 1986. Neither the CIT nor the SPT have had ring fencing of fields. Exploration, development, and operating costs are deductible in income from other fields.

3. Move towards neutrality: how and why?

Starting in 1986 there has been a deliberate move towards a neutral system of state participation and taxation. This section will explain what is meant by neutrality, and how and why the system has approached the ideal of neutrality over time.

In economic theory of taxation (e.g., [13—15]), a tax is considered to be neutral if it does not affect companies' decisions as compared with a situation without that tax.[2] Based on the standard neoclassical theory of the firm, the basic requirement for neutrality is symmetry. The marginal tax rate on income should be the same as the marginal tax reduction rate on all sorts of costs. This gives a neutral tax system because firms' valuation of projects has the property known as value additivity. There are no income effects.

A neutral tax could be implemented as state participation or as a proportional tax on real cash flows,[3] with immediate payout in years with negative net cash flow, suggested by Brown [16]. If deductions for investments and other costs are instead postponed (as depreciation and uplift deductions and loss carry-forwards), their values for the firms must be maintained by accumulation of interest. For neutrality this interest accumulation, possibly with guarantees that the deductions will eventually be earned, must be sufficient for the firm to be indifferent between immediate and postponed deductions.

In most systems of taxation and state participation in resource extraction, non-neutrality is the consequence of various forms of

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[1] In this article, "royalty" denotes a tax (ad valorem or per unit) on gross revenue, with no or very limited deductions for production and transportation costs. This is regarded as a type of tax.

[2] The comparison here could be with a situation without any taxes in Norway, or without any taxes anywhere, or with only the Norwegian CIT applying to the sector. This last comparison has been the explicit aim of Norwegian authorities. Since the CIT with a 28 percent rate supposedly drives a 28 percent wedge between nominal before- and after-tax required rates of return (or more under uncertainty), the aim has been that taxes in the petroleum sector should result in the same wedge. This can, e.g., be achieved if SPT-cum-state-participation is neutral in comparison with a no-tax situation, and then the CIT is applied to cash flows after these.

[3] The cash flow consequences of these two are the same, except, perhaps, if an international oil company also faces taxes at home, see below.

asymmetry.[4] Royalties reduce after-tax income per barrel (or other unit), but not the cost per barrel, so that some barrels cannot be profitably extracted.[5] Asymmetric treatment of profits and losses have the same consequence, in particular under uncertainty. Progressive scales of royalties or state participation will similarly reduce incentives for exploration and investments.

Asymmetry is particularly harmful when exploration is risky, long-lasting, and costly. If a tax reduces the after-tax value of possible discoveries by, e.g., 78 percent, then neutrality requires that the tax also covers 78 percent of exploration costs immediately, or allows high enough postponed deductions that the companies regard these as equivalent with such immediate deductions.

Of the changes listed in Table 1, the two reforms of state participation in the nineties were in the direction of neutrality. The phasing out of royalties (positive or negative) and the improved provisions for loss offset mean that the tax system gradually approached neutrality as well. The reforms after 2000 were motivated in particular by the fact that incumbent companies had substantial advantages compared with entrants. An introduction of field ring fencing could have put these on equal footing. But instead of making tax deductions more, and equally, risky for all (through ring fencing), the reform went in the opposite direction, making them less, and equally, risky for all. Since deductions are received with almost full certainty, the rate used for interest accumulation does not include a risk premium. Since there will always remain some political risk, there is still some controversy in Norway over whether postponed deductions for investments (depreciation and uplift) are sufficient to lead to neutrality. But in an international perspective, the significantly improved loss offset provisions (in particular, the refund of the tax value of losses from exploration, and of any remaining losses when companies leave) distinguish the SPT and move it close to the ideal of neutrality. The theoretical neutrality of SDFI is not disputed, except perhaps by those who claim that there are income effects in decisions of companies.

The obvious argument for a neutral system is that it leads to a maximization of total value of the activity. International oil companies are invited into the sector because they have some unique technologies, and perhaps also personnel and capital, that the state cannot get hold of elsewhere. A neutral system of taxes and state participation should induce them to maximize the total value of the activity. With an average (and marginal) rate of about 78 percent, the tax system on its own will take a large fraction of value. But before that, the SDFI takes its share, which varies between zero and 58 percent. The combined effect is thus a government take that varies between 78 and 91 percent. A high rate of tax-cum-participation will take a high fraction of the maximized value for the state.

Before discussing this any further, it is worth noting that the loss from distortions from a particular asymmetric tax system will differ between different activities. In the language of economics, this depends both on production possibilities and prices (including factor prices), and the uncertainties in these, which all vary in time and space. In some regions, for some resources and sets of prices and costs, and risks, most resources will be discovered and extracted, and little is lost. In other regions, the expected profitability of exploration is lower as seen from the outset of activities, and/or there is more risk. Exploration may then be much distorted by an asymmetric tax system. Moreover, if and when deposits are found, there will be marginal reserves within each deposit, so that the recovery rate can be distorted

to a smaller or larger extent by taxes.[6] It should also be noted that the scope for tax distortions will depend on regulations and contracts. If authorities have sufficient information, they may prohibit some inefficient outcomes and require efficient ones.

One natural question is, what could be reasons for having both the SDFI and the SPT in the same sector. As described so far, both are in some sense neutral rent taxes. But there are some differences, which may justify why both are being used. Clearly, the SDFI gives a separate role for the state as partner in licenses, with its say in decisions.[7] In addition, the SDFI fraction of ownership is set by authorities when licenses are awarded. From the perspective of tax theory, this is neutral, as opposed to a "sliding scale" or similar. Differentiated SDFI fractions emulate a kind of individual taxation of licenses, typically with higher SDFI fractions of those that are more promising ex ante. This could be a result of trade-offs by authorities of risk versus revenue, with different results according to the prospects of each license. Arguments that are non-standard in economics may perhaps also be part of the explanation. The differentiation could be a method for authorities to take account of income effects, if any, i.e., claims by companies that they need some minimum expected volume of cash flow to be interested in a license. There could also be a corresponding view in public opinion, which would be an argument for the same differentiation: Since the resources are national property from the outset, the public opinion may find it unacceptable that oil companies take away a large profit, in absolute terms, from a single license.

An advantage of having a high SPT rate applied to cash flows after SDFI, is due to the design of international tax treaties to avoid double taxation, in particular vis-a-vis the U.S. These rules are complicated (cf. [24], p. 386) but the general picture is as follows. Norway has established that its CIT and SPT are both regarded as taxes by U.S. authorities. Then oil companies from the U.S. will not pay taxes at home on their income from Norway. This gives more room for Norwegian taxation (before companies lose interest), which is clearly advantageous for Norway. If only the SDFI is applied in Norway, home (U.S.) country taxes would also apply, and would typically distort decisions. If SDFI and CIT are applied, but not SPT, the total effect would depend on a comparison of Norway's and the home country's CIT, and could vary with circumstances.

A tricky issue in the literature on resource taxation since 1975 has been the appropriate discount rate to apply. In that year Garnaut and Clunies Ross [25] proposed a system they called the Resource Rent Tax (RRT). In the simplest (one-tier) form, the RRT taxes the real (non-financial) cash flows from resource extraction, allowing carry-forward of negative net yearly cash flows (if any) with interest accumulation, to be deducted in subsequent positive cash flows. The authors suggested the company's after-tax cost of capital (its discount rate) as the appropriate rate for interest accumulation. This supposedly reflects some average risk of the company's activities. Two related problems with the proposal have been highlighted in the subsequent literature.

An obvious problem has been the asymmetric treatment of positive and negative cash flows. The proposal did not include any form of refund in case the company shuts down with unused deductions. Several authors (e.g., [26–28]) have pointed out that the RRT is not neutral due to this asymmetry.[8]

The more subtle problem has been the use of a discount rate adjusted for average risk. Theory ([13,14]) suggests that the discount

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[4] Many aspects of resource taxation are left out here to save space. See the surveys by Lund [17], Boadway and Keen [18], and Smith [19]. The Norwegian system is discussed in Refs. [20,21].

[5] A separate argument for royalties may be that they are more easily administrated than other types of taxes. The trade-off of administrative costs versus tax distortions will not be discussed here.

[6] This is analyzed for two early versions of the Norwegian system in Ref. [22], based on theories from financial economics.

[7] Voting rules prevent Petoro from making majority decisions on its own, even where SDFI owns majority. To save space, I do not include a detailed description of the voting rules and their merits and demerits. See Ref. [23].

[8] I would like to think that the quantification of this effect for another asymmetric system, in Norway, in Ref. [22] was one of the inspirations for the country to introduce refund arrangements in its petroleum tax system.

rate should leave the company exactly indifferent between an immediate refund and a postponement with interest accumulation, and that the risk of postponed tax deductions should be considered separately. On this, the IMF [11] states, "The benchmark result on this issue is that if deferred tax benefits are certain to be ultimately received by the taxpayer (including, if necessary, as payments from the government), then carry forward of unrealized benefits at a risk-free rate is in principle appropriate" (p. 48). Moreover, "Where there is doubt as to the governments commitment to provide these benefits, risk-adjustment for that possibility—which, importantly, does not mean adjusting for the riskiness of companies own cash flows—is appropriate" (ibid.). Norwegian authorities have tried to achieve the first ("risk free") case by trying to effectively guarantee the deductions. In the second case, there will always be a problem that the risk of the future deductions varies a lot between situations and companies. When the activity is risky, one cannot design a neutral tax system that is asymmetric.[9] There is thus necessarily a trade-off between the government's desire for a maximization of (total, pre-tax) economic rent and the wish to avoid the risks of carrying a large part of the costs.

Based on history and supported by theory, the conclusion of this section is that Norway has been well served by a system that over time has approached symmetry and neutrality. In spite of the very high rates of tax-cum-participation, there is a high interest for new licenses. The number of companies has increased from 30 in 2000—2002 to more than 50 in 2007—2011. The increase started in 2003 when the oil price was still low. Exploration and other investment have been increasing.

4. Lessons: the fiscal system, risk

Although today's system serves Norway well, it is risky and costly for the state. This would be true in particular if such a system were applied in a country where exploration starts at a large scale. The system may serve as an example for countries that are sufficiently wealthy and willing and able to take the risk, or for countries that are willing to open for resource activity only gradually.

A distinguishing feature of a neutral system (in Norway (as an approximation) as well as in theory) is that the state takes a high fraction of costs when it wants a high government take (i.e., average tax rate including participation). This implies taking a high risk, in particular from the outset if exploration is started on a large scale and there is high uncertainty over what to find. Not only will the government face uncertainties over future revenues due to geology and resource prices. This would typically be the case also in non-neutral tax systems, except under pure cash-bonus bidding. But, moreover, in a neutral system there are costs to be incurred before any future revenue prospects can be secured.

In many countries this would be a high burden on public finances. State participation without carried interest incurs costs, just like a pure cash flow tax would do. And a tax system with postponed deductions would in reality have the same costs for the government if the deductions are guaranteed. In that case there are no immediate payouts from the state when costs are incurred. But in order for a guarantee to have the desired effect, it must be credible and thus equally costly. Some governments may not be able to provide such credibility. The problem is related to borrowing constraints or high interest rates faced by some states.[10]

A lower rate of taxes and/or state participation will reduce the costs and risks to the government, but will also reduce the possible positive outcomes. This is a necessary feature of a neutral system. While Norway has decided that the costs and risks are acceptable, this may be different for other countries. In light of the history, it seems that it used to be different for Norway, as well. In fact, before much was known about the resource base, and when Norway was less wealthy,[11] the system was designed with very substantial asymmetries. Perhaps the lesson to be learned is to start with such asymmetries, and then develop the system towards neutrality if circumstances allow. One could perhaps conclude that an asymmetric, non-neutral system is inevitable, or perhaps the optimal choice, at the outset of activities. The government would deliberately choose a system which would lead to tax distortions in early activities. But there are other possible policy recommendations that should be explored.

One recommendation could be to start with a neutral system with a lower rate, i.e., a lower tax rate and/or smaller fraction of state participation. This could be increased gradually as uncertainty is lowered through exploration and learning. But one should be aware of the problem of time inconsistency. If tax increases are going to apply also to activity that is already started, it would be seen by the companies as unreliable behavior. They would worry about this from the outset, and one might want to enter into fiscal stabilization clauses. These have their own problems, cf. [30]. To avoid time inconsistency and/or a messy situation with different tax rules applying to different cohorts of licenses, one could maintain a stable neutral tax system for the whole resource sector. To obtain the increased rates, one might increase a neutral form of state participation in new licenses.

Another recommendation could be to start activities slowly, perhaps combined with a neutral system. The discussion above has not seen the timing of licenses as a decision variable, but for most governments, it is. Many governments seem eager to start at a big scale soon. But if the consequence of this is that they must either allow companies to take away much of the values, or accept tax distortions that leave many resources underexploited, the governments may realize that a slower pace is an advantage. This will allow learning and a reduction of uncertainty, perhaps also a gradual increase in revenue, while at the same time the costs undertaken by the government in any year may be at an acceptable, low scale. For many nations there will be the additional advantage of having better time to build competence and absorb the income one hopes for.

In light of tax theory, delay of licensing could be distortionary unless justified by some specific market failure. Governments should be careful to regulate for, e.g., rational transportation solutions when there are economies of scale in pipelines. There are also positive externalities of exploration in adjacent areas. The overall pace of licensing from a competitive market solution could be Pareto optimal in some theories from resource economics. But these theories are seldom relevant, in particular since almost all governments regulate pace. For most (small) governments, the resource price is typically viewed as exogenous, and one could try to forecast prices and the possible loss (if any) in present value of extraction, from a delay. This is in itself so uncertain that the above-mentioned gains from a delay may be more important.

5. Lessons: licensing and partnerships

A system of symmetric taxes and state participation, with a combined take between 78 and 91 percent, implies that the government carries the same high fraction of all costs. Naturally, this will only be politically acceptable if the government has some influence on decisions. This is partly formalized through legislation and voting rules in

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[9] Bond and Devereux [14] show a related, more general result: When the activity is risky, one cannot design a neutral tax system that is progressive. To save space, progressivity is not discussed here. See Refs. [17,18] for merits and demerits.

[10] The quotation above ([11], p. 48) shows that the IMF is aware of the problem that some countries cannot credibly commit to a refund of unused deductions.

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[11] In 1970, Norway's GDP per capita was 94 percent of the OECD average, while it was 179 percent in 2012, see Ref. [29]. Both ratios are based on PPP adjusted numbers. New members have entered the OECD in the period.

each license, but partly happens through informal or ad hoc channels. The system relies on a high degree of cooperation and consensus to operate. There have been tensions at times. But the typical picture is cooperation both within each license and more generally between authorities and companies.

A particular type of cooperation which is required of the companies, follows from the awards of licenses to groups of companies. The non-operators will contribute financially and have their say in all important decisions. The license partnerships will typically exchange lots of viewpoints and thus information, also with the authorities, who will be present. This promotes the diffusion of technology.

The advantage for authorities of composing license partnerships, much stressed by Al-Kasim [1], is also an argument against awarding licenses through auctions ([1], p. 209). It would be difficult for authorities to compose partnership if auctions are used. Moreover, the criteria for licensing include merit, technical competence, and financial strength, as evaluated by authorities.[12] Cooperation is promoted instead of competition. The "merit" part implies that "the government used its privilege to reward and punish companies on their past performance in licence rounds" ([1], p. 194).

The partnerships may also be a mechanism to reduce the problem (for authorities) known as transfer pricing and income shifting. A high combined rate of tax and participation creates incentives for companies to transfer income away from the sector and costs into it, cf. [31]. In addition to transfer pricing, this includes the incentive to test new technology and train personnel in that jurisdiction where the tax system covers the highest fraction of the costs. To some extent transfers and income shifting can be monitored and prevented by authorities, applying the OECD guidelines (cf. [24], p. 390), but this will not solve the problem completely. When there are license partnerships, one can hope for an additional preventive effect. To the extent that an operator undertakes such transfers for its own benefit, the other license participants may be able to monitor and prevent. To the extent that all participants benefit, e.g., from a test of new technology, the system promotes diffusion of technology, which may be good for both partnership and country, internalizing otherwise (positive) external effects. The theoretical prediction is not only that high tax rates leads to testing of more technology in the country. In addition, the required partnership cooperation and its internal monitoring will tend to accept such testing that can lead to learning by many participants, and reject testing that only benefits the operator.

In fairness to those who promote auctioning of licenses (e.g., [32]), it should be noted that the mechanism just mentioned, of internal monitoring between licensees, is less important if the rent is collected to the state via auctions. A rent tax may then be unnecessary, and the problem of transfer pricing and income shifting would be much smaller, perhaps non-existent.

6. Conclusion

The Norwegian system of state participation and taxation is viewed primarily as a revenue collector, which means that state participation is regarded in much of the article as another tax. Even though the system is well developed and follows international recommendations, it is not straightforward to recommend that other nations copy the system as it is today. The model may serve Norway well for the time being. But it has been developed over time in response to that country's endowments and experiences. To take the current end product as a model for other nations is somewhat unrealistic.

In particular, Norway accepts large costs and large risks in the system as it is today. This may be acceptable in the country's current situation, given its wealth and diversification. But for a nation with lower and less liquid per capita wealth the risk will be less welcome. Credit constraints may also prevent state participation, and guarantees of tax deductions in the future may not be fully credible. This feature of the Norwegian system may thus be undesirable or unattainable or both.

For nations that are not going to accept as high costs and risks, there are nevertheless lessons to learn. The article has described the trade-off between higher tax revenue and higher risk. If one insists on a neutral tax system, it must be symmetric, and the state thus incurs costs and risks in proportion with the tax rate. One could opt for non-neutral taxes, which reduce costs and risks, but reduce incentives for exploration and other investment. There is also the possibility to partly circumvent the trade-off by a slow pace of licensing.

Some other advantages of the Norwegian model are also discussed, in particular, the authorities' composition of license groups with many participants.

Acknowledgments

References

[1] F. Al-Kasim, Managing Petroleum Reserves: the Norwegian Model in a Broad Perspective, Oxford Institute for Energy Studies, Oxford, 2006.
[2] M.C. Thurber, D.R. Hults, P.R.P. Heller, Exporting the 'Norwegian model': the effect of administrative design on oil sector performance, Energy Policy 39 (2011) 5366–5378.
[3] O.G. Austvik, Landlord and entrepreneur: the shifting role of the state in Norwegian oil and gas policy, Governance 25 (2012) 315–334.
[4] O.A. Engen, O. Langhelle, R. Bratvold, Is Norway really Norway, in: B. Shaffer, T. Ziyadov (Eds.), Beyond the Resource Curse, University of Pennsylvania Press, Philadelphia, 2012, pp. 259–279.
[5] M.C. Thurber, B.T. Istad, Norway's evolving champion: Statoil and the politics of state enterprise, in: D.G. Victor, D.R. Hults, M.C. Thurber (Eds.), Oil and Governance, State-owned Enterprises and the World Energy Supply, Cambridge University Press, Cambridge, 2012, pp. 599–654.
[6] K. Appiah-Adu, The Norwegian experience: potential lessons for Ghana and other African countries, in: K. Appiah-Adu (Ed.), Governance of the Petroleum Sector in an Emerging Developing Economy, Gower, Oxford, 2013, pp. 271–283.
[7] À. Cappelen, L. Mjøset, Can Norway be a role model for natural resource abundant countries?, in: A.K. Fosu (Ed.), Development Success: Historical Accounts from More Advanced Countries, Oxford University Press, Oxford, 2012, pp. 44–72.
[8] H. Mehlum, K. Moene, R. Torvik, Mineral rents and social development in Norway, in: K. Hujo (Ed.), Mineral Rents and the Financing of Social Policy: Opportunities and Challenges, Palgrave Macmillan, Basingstoke, UK, 2012, pp. 155–184.
[9] S. Holden, Avoiding the resource curse the case Norway, Energy Policy 63 (2013) 870–876.
[10] P. Collier, Principles of resource taxation for low-income countries, in: P. Daniel, M. Keen, C. McPherson (Eds.), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, Routledge, New York, 2010, pp. 75–86.
[11] IMF, Fiscal Regimes for Extractive Industries: Design and Implementation, Report 15 August, International Monetary Fund, Washington, D.C., 2012.
[12] BP, Statistical Review of World Energy, BP, London, 2013. Available at, http://www.bp.com.
[13] G. Fane, Neutral taxation under uncertainty, J. Public Econ. 33 (1987) 95–105.
[14] S.R. Bond, M.P. Devereux, On the design of a neutral business tax under uncertainty, J. Public Econ. 58 (1995) 57–71.
[15] D. Lund, Petroleum tax reform proposals in Norway and Denmark, Energy J. 23 (2002) 37–56.
[16] E.C. Brown, Business income, taxation, and investment incentives, in: L. Metzler, H.S. Perloff, E.D. Domar (Eds.), Income, Employment, and Public Policy: Essays in Honor of Alvin H. Hansen, Norton, New York, 1948, pp. 300–316.
[17] D. Lund, Rent taxation for nonrenewable resources, Annu. Rev. Resour. Econ. 1 (2009) 287–308.
[18] R. Boadway, M. Keen, Theoretical perspectives on resource tax design, in: P. Daniel, M. Keen, C. McPherson (Eds.), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, Routledge, New York, 2010, pp. 13–74.

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[12] The possible challenge of corruption does not seem to play any role in the licensing in Norway so far, at least not known to the public. This challenge could be a separate reason for using auctions, not discretionary licensing.

[19] J.L. Smith, Issues in extractive resource taxation: a review of research methods and models, Resour. Policy 38 (2013) 320—331.

[20] N. Bjerkedal, T. Johnsen, The petroleum tax system revisited, in: S. Glomsrød, P. Osmundsen (Eds.), Petroleum Industry Regulation within Stable States, Ashgate, Aldershot, UK, 2005, pp. 157—175.

[21] P. Osmundsen, Time consistency in petroleum taxation; lessons from Norway, in: P. Daniel, M. Keen, C. McPherson (Eds.), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, Routledge, New York, 2010, pp. 425—444.

[22] D. Lund, Petroleum taxation under uncertainty — contingent claims analysis with an application to Norway, Energy Econ. 14 (1992) 23—31.

[23] U. Hammer, Models for state ownership on the Norwegian continental shelf, in: A. McHarg, B. Barton, A. Bradbrook, L. Godden (Eds.), Property and the Law in Energy and Natural Resources, Oxford University Press, Oxford, 2010, pp. 159—166.

[24] P. Mullins, International tax issues for the resources sector, in: P. Daniel, M. Keen, C. McPherson (Eds.), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, Routledge, New York, 2010, pp. 378—402.

[25] R. Garnaut, A. Clunies Ross, Uncertainty, risk aversion and the taxing of natural resource projects, Econ. J. 85 (1975) 272—287.

[26] W. Mayo, Rent royalties, Econ. Rec. 55 (1979) 202—213.

[27] R. Ball, J. Bowers, Distortions created by taxes which are options on value creation: the Australian Resources Rent Tax proposal, Aust. J. Manag. 8 (1983) 1—14.

[28] B. Smith, The Impossibility of a Neutral Resource Rent Tax, Working Paper in Economics and Econometrics, Australian National University, Canberra, 1999.

[29] OECD, National Accounts at a Glance, Interactive Web Pages, Organisation for Economic Co-Operation and Development, Paris, 2014. Available at, http://stats.oecd.org. downloaded 17 January 2014.

[30] P. Daniel, E.M. Sunley, Contractual assurances of fiscal stability, in: P. Daniel, M. Keen, C. McPherson (Eds.), The Taxation of Petroleum and Minerals: Principles, Problems and Practice, Routledge, New York, 2010, pp. 405—424.

[31] D. Lund, Rent taxation when cost monitoring is imperfect, Resour. Energy Econ. 24 (2002) 211—228.

[32] W.J. Mead, Toward an optimal oil and gas leasing system, Energy J. 15 (4) (1994) 1—18.