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A short overview

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Rent taxes on natural resources in Norway: A short overview

By

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Abstract

For a long time, Norway has had resource rent taxes on oil- and natural gas extraction as well as on hydropower generation. Recently, resource rent taxes have also been levied on aquaculture, and wind power generation. This paper, gives a short overview of the rent theory, the basis for rent generation in Norway, the size of rent generated, the Norwegian tax system for resource rent for each of the resources considered, and the rent taxes collected.

Key words: Natural resources, economic rent, resource rent tax, Norway

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Introduction

Norway has a long tradition for taxing resource rent. The rent tax on oil and natural gas production was introduced in 1975, after it became clear that the income from the recently discovered Ekofisk field and other fields would become sizable. To handle the large income from this sector a specific oil fund arrangement was established in 1990, where income was invested in bonds and stocks outside of Norway. Later this fund has changed name to Government Pension Fund Global. Ultimo 2024, the market value is about 20.000 billion NOK (about 1.800 billion USD).

The resource rent tax regime for hydropower generation was established in 1997 in the aftermath of the Energy Act (1990) and the electricity deregulation process in 1992. Prior to this the resource rent of the power plants had more or less been handed out in terms of low prices to the inhabitants in the municipalities or counties owning the power plants. The public companies involved were governed by non-profit regulation, so that the companies with the most favourable natural conditions and the highest potential resource rent would be able to sell electricity at the lowest price. With the deregulation process and the emerging electricity market and trade in electricity, resource rents started to manifest itself.

The resource rent tax on aquaculture is much more recent and was established in January 1, 2023. The background for this tax was the large surpluses stemming from salmon farming in recent years. These surpluses primarily benefitted a couple of the world´s largest companies selling salmon on the international market.

A resource rent tax of onshore wind power was established on January 1, 2024. According to the Government the resource rents for the existing wind power farms are probably not very high, and not many of them will enter into a tax position for actually paying a resource rent tax. However, it is expected that this will change for new wind power farms that will be established in the coming years. It is a specific argument for the Government that it is beneficial with an early introduction of a resource rent tax for wind power since it would be more complicated to introduce such a system when the industry has matured.

The classic concept of land rent: A glimpse of the history

The existence and size of land rent have presumably been discussed ever since land owners started to trade land and rent out land to others. Also, the theoretical development of the land rent concept goes far back in history. Schumpeter (1954) finds that the first theoretical contributions to the land rent concept started with the "physiocrats" (e.g., Francois Quesnay and Anne Robert Jacques Turgot). Others think it goes even further back (see, Amundsen, 1988).

David Ricardo is often considered to be the first to formulate a precise theory of land rent. But before him, James Anderson (1777 a, b; 1801) had developed many of the same ideas that David Ricardo later became known for (e.g., the idea of "differential rent") and prior to that Adam Smith wrote more than 100 pages on land rent in the "Wealth of Nations" (1776).

Further, David Ricardo was not the only one in his time to analyse the land rent concept. For instance, during three weeks of February 1815, two other contributions to the land rent concept were published (by Edward West, and Thomas R. Malthus) in addition to a contribution by David Ricardo. Common to these, were that they all separated land rent from the remuneration to invested capital on land. The reason why David Ricardo became known as the inventor of land rent theory is probably his superb analytical qualities in treating the subject.

For David Ricardo, the origin of land rent is to be found in "the original and indestructible powers" of the soil (1817). For the exposition to follow, it may be worth wile summing up some of his contributions as these are still valid today:

- Good land is scarce and varies in quality and location. Land rent can be measured differentially relative to the extensive margin that carries some or no rent.
- A high rent on land is not due to monopoly prices. Rent exists also under normal conditions (i.e., competitive conditions)
- A high price on the agricultural product grown, is not high due to a high rent. It is the other way around. Rent should be measured residually
- Rent increases as demand for the product increases and both the intensive and the extensive margins are expanded.
- The scarcity value of Nature´s built up physical capital should be distinguished from land rent (even though Nature´s built up physical

capital may be seen as created by Nature´s "original and indestructible powers").

Later on, the theory was further developed and generalized. Some of the most important contributions were given by Johann Heinrich von Thünen, (e.g., the importance of transportation costs for determining best use of land and the value of land rent), John Stuart Mill, (e.g., that rent should be understood in an equilibrium setting and that rent-like surpluses also accrue for unique entrepreneurial skills), Carl Menger (e.g., that land rent should be related to the opportunity cost of land and that rent on any input could be understood as the surplus over and above the payments necessary to call forth the services), Alfred Marshall (e.g., that rent may be found also for man-made goods in terms of quasi-rent), Lewis C. Gray and Harold Hotelling (e.g., that resource rent must refer to the scarcity values that appear as the physical natural capital is optimally exploited).[2]

Natural resources and the basis for economic rent

Some of the natural resources represent Nature´s built up *physical capital* and some provide *ecosystem services*. As few of these resources can be created artificially at reasonable cost, they are scarce and carry a rent (or scarcity value) if they are in high demand. These goods cannot be replicated or moved as a remedy for increasing scarcity, even though substitution to some extent, may take place. Hence, in the face of increasing demand, price of product grown will increase and so will the size of rent.

Nature´s built up capital may be considered *produced goods* that only need to be extracted (depletable resources), harvested (biomass) or abstracted (ground water). The ecosystem services provide *inputs* in production processes that may be driven by Nature itself (e.g., nutrients and plankton as input for biomass production driven by natural biological growth). However, the ecosystem services may also in some cases be considered produced goods e.g., the benefit we receive as we admire a beautiful landscape or the pleasure we get from hiking in the mountains.

Further, it seems fruitful to distinguish "land" from biological resources or physical capital attached (e.g., soil resources). "Land" should be understood broadly as space, place, site or area where economic activity

[2] An overview of the historical development of the more general economic rent theory, including the concepts such as pure scarcity rent on the extensive margin, rent under monopsony and monopoly, quasi rent etc. may be found in Amundsen (1988).

may be found (onshore or offshore). Land has different physical attributes and may carry a rent. There is always the locational rent of geographically dispersed resources.

Origin of rent for the natural resources that are subject to rent taxes in Norway

The scarcity value of *oil and natural gas resources* is linked to the quality of oil or gas, and the location of the production sites (e.g., proximity to market, harshness of climate conditions at production site that in part determines the cost of extraction). As depletable resources, their scarcity value can also be understood as the *in-situ* value.

For *hydropower resources* the origin of rent is the topography (e.g., natural water reservoirs, vertical distance of free water fall), location, and precipitation (rain and snow) that eventually fill the water reservoir. The annual precipitation cycle constitutes a renewable service by Nature, whereas water contained in the reservoir may be considered a depletable stock of resource carrying a scarcity rent (so-called "water value").

For *wind power* the origin of rent is the wind itself, its strength and stability, but also the quality of the site of wind power generation (e.g., the site´s ability to catch the wind and its location relative to market).

For *aquaculture*, the origin of rent is the ecosystem services provided in terms of the nutritional richness of water, oxygen, temperature, and location (e.g., weather sheltered sites, and distance to market), combined with Nature´s powers in terms of natural biological growth.

Measuring the resource rent in theory

Consider any piece of "land" providing scarce services that are used as unpaid inputs in the production of a good that is sold in a competitive market in equilibrium. In such a setting the rental value of the piece of land considered will, by the way of competitive market forces, be equal to the surplus above the normal return on invested capital.

Alternatively, one may say that the rental value is equal to what is left of the surplus after all other necessary inputs have received their market-

based payments. Likewise, for the scarcity value of an unpaid *in-situ* stock of natural capital. To arrive at a measure of resource rent from the point of view of society, negative externality costs should also be deducted from the surplus.

Measuring the resource rent according to the UN – System of National Accounting (SNA)

The System of Environmental Economic Accounting (SEEA), which is a satellite system of the UN –SNA, gives a guidance of how to measure the size of resource rent:

Output (sales value of extracted or produced goods)
- Intermediate uses (cost of inputs)

= *Value added*
- Other taxes on production
+ Other subsidies on production
- Labour costs

= *Gross operating surplus*
+ Specific taxes on production (e.g., unit taxes)
- Specific subsidies on production (e.g., unit subsidies)

= *Gross operating surplus for the derivation of resource rent*
- Consumption of fixed capital (depreciation)
- Normal return to invested capital

= *Resource rent*

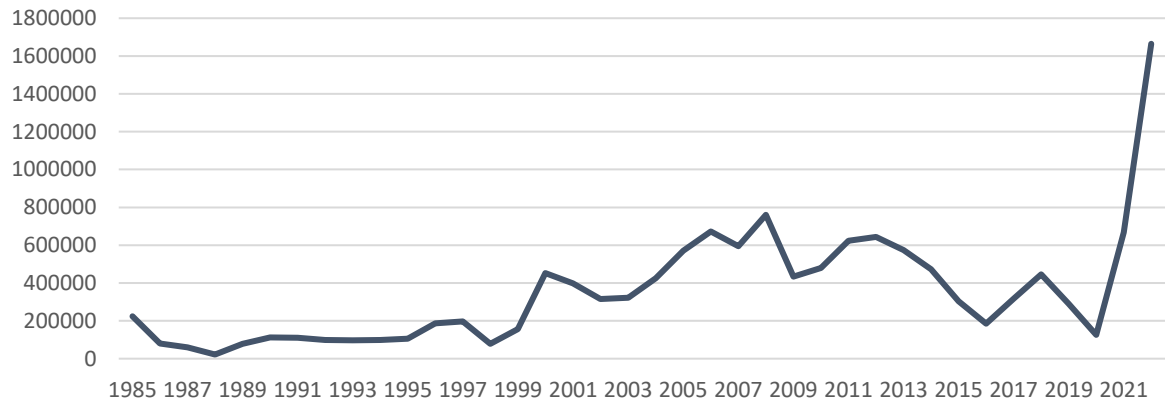
There are two observations to be made for this system. First, per unit taxes should be added and per unit subsidies should be subtracted to arrive at the proper size of rent. The idea is to identify the correct demand and supply of the product without distortions. Apart from this, the other taxes (e.g., property tax) and subsidies mentioned in arriving at the gross operating surplus, do not directly affect production at the margin, and should, thus, be subtracted and added, respectively.

The second observation relates to the cost of capital for the company considered. Deduction of the value of consumed capital (depreciation) is normal procedure for determining the tax base also for corporate taxes. However, the deduction of the normal rate of return on invested capital is specific for determining the tax base for resource rent tax. This is seen to be in line with the theoretical principle considered above.

Assessed resource rent for Norwegian oil and gas extraction 1984-2022

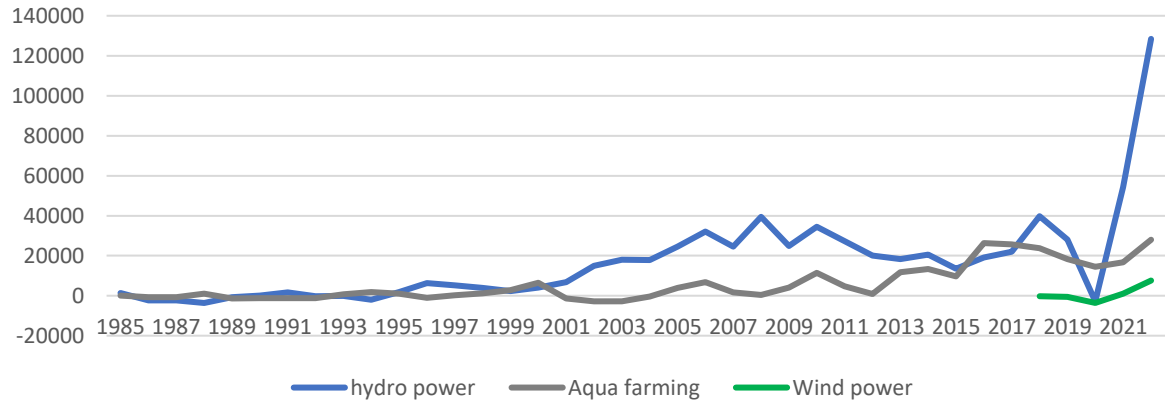
Statistics Norway (Dalen et al., 2023) has calculated the resource rent for many of the natural resources in Norway. Based on data published in this study, the following development of the resource rent of oil and natural gas production has been calculated (see Fig. 1.).

Fig. 1. Resource rent 1984-2022 for oil and gas production, Norway (Million NOK). Source: SSB, 2023/24



Likewise, the resource rent of aquaculture, hydro power, and wind power generation, 1984-2022 have been calculated (see Fig 2.).

Fig.2. Resource rent 1984-2022 for hydropower, aquaculture and wind power, Norway (Million NOK). Source: SSB, 2023



Specific reasons for levying rent taxes

In many cases, the Government has, at the outset, made the resources available free of charge to the companies (e.g., production sites for aquaculture or oil and gas resources). Rent taxes can be seen as payment for this. The alternative for the Government could be: sell on "root" and get the remuneration up-front.

However, rent taxes are also levied on natural resources irrespective of who owns the land to which the resources are related. The argument used by the Government is that the society´s common resources should benefit all Norwegian citizens. Hence, to some extent, it is as if land ownership is separated from the resources attached to land.

Resource rent (RR)-tax systems: general principles

There are some common general features for all resource rent (RR) taxes levied in Norway. For all RR-taxes, Norway uses a cash flow system where all investments are deducted directly in the RR-tax base so that there is no longer a need to make deductions over time for depreciation and normal return on invested capital. This implies that the State pays a share of the investment (share corresponding to the RR-tax rate), and demands the same share of the resource rent. Hence, the State enters as a "partner" in the project.

For the investing company, this implies that the company has exactly the same rate of return after the RR-tax as prior to the RR-tax. In this sense, the tax is neutral for the company. This does not, however, mean that all investments are optimal from the point of view of society. For instance, the State passively follows the decisions of the investing company as they are driven by the company´s cost of capital and discount rate that may deviate from that of a social planner´s.

As for investments made earlier than the introduction of the RR-tax, these are, written off along the way with ordinary depreciation allowance and a "free income" allowance representing normal return on the investments.

Prior to taxation, corporate income tax can be deducted from the resource rent tax base, with a corresponding adjustment of the tax rate so

that the marginal tax on the resource rent is equal to the sum of the corporate tax (22 pct.) and the announced resource rent tax. For example, the tax rate for hydropower after deduction of the corporate tax, is equal to 45/(1-0,22). Hence, the marginal total tax rate of hydropower resource rent (prior to the deduction of corporate taxes) is equal to 67 pct. (See Table 1.)

Production taxes can be deducted "krone by krone" from the corporate tax.

Negative resource rent is treated somewhat differently for the various resources. For hydropower plants, and oil and gas production installations, negative resource rent can be deducted from positive resource rent on other hydro power plants or oil and gas installations in the companies. The tax value of the remaining negative resource rent will, to ensure neutrality, be paid out directly to the company.

For aquaculture, negative resource rent can be deducted from positive resource rents for other plants in the company. The tax value of the remaining negative rent will not be paid out directly but the negative resource rent can be forwarded at an interest rate decided by the Government and deducted from next years´ positive resource rent.

For new wind power plants, negative resource rent can be paid out directly as they are set in operation. Prior to the operation phase, negative resource rent tax can be forwarded to later periods with an interest. For existing wind power plants, the value of assets can be increased by up to 40 pct. and written off linearly over 5 years.

The resource rent tax rates and production taxes on Norwegian natural resources for the years 2023/2024 are presented in Table 1.

Resource	Company tax (pct)	RR-tax (pct)	Production tax (NOK)
Oil and natural gas	22	56	0
Hydropower	22	45	0,013 per kWh
Aquaculture	22	25	0.9 per kg
Wind power	22	25	0,023 per kWh

Table 1. Tax-rates on Norwegian natural resources (Ultimo 2023)

Excise taxes on production go to the municipalities or counties were the economic activity takes place, while the RR-taxes go to the State, but may also be shared with the municipalities and counties.

Specifics relating to the various RR-taxes

Oil and natural gas

Around 40 oil companies are involved on the Norwegian continental shelf. Of these, 28 are active operators. The largest companies are Equinor (former Statoil), Aker BP, Lundin, Norske Shell and Total.

Production is evaluated at prices set by *Normprisrådet* which is an independent price board. To arrive at the resource rent tax base all relevant expenses are deductible (e.g., expenses for exploration, research and development, finance, operation and abandonment of old infrastructure).

Hydropower

In 2023, municipalities, counties and the State owned about 90 pct. of the generation capacity. Of this, the State had about 30 pct. through its company, Statkraft.

The power plants have to pay a license fee and are also obliged to deliver so-called "licensing power" of up to 10 pct. of the power generated

to the municipalities or counties. The value of this is deductible in the corporate tax and the RR-tax.

In 2022/23 the Government decided, preliminary, to increase the acquisition of resource rent above the RR-tax due to an extremely high resource rent.

Power stations with a capacity of less than 10.000 kVA are exempt from the RR-tax system.

Aquaculture (salmon, trout and rainbow trout)

Companies are typically privately owned. The four largest companies in the world are Norwegian (Mowi, Lerøy Seafood Group, Cermaq, SalMar).

The value of the delivered biomass is set at the edge of the net pen and prices are determined by an independent price board (so-called "norm prices").

The RR-tax base is determined after deductions of the ordinary expenses (including expenses on smolt and feed). Also, cost of capital is deducted, but the value of fish in the pen is not considered a part of capital, since according to the Norwegian national accounting system fish is not considered as livestock. Otherwise, there is a standard deduction of NOK 70 million.

The general rule is that deductions are not granted for licenses as these traditionally were handed out free of charge. For capacity sold at the auctions in 2018 and 2020, and the fixed-price allocation in 2020, a template deduction of 40 pct is permitted over four years. Licenses have no time limit, but can be traded.

Onshore wind power

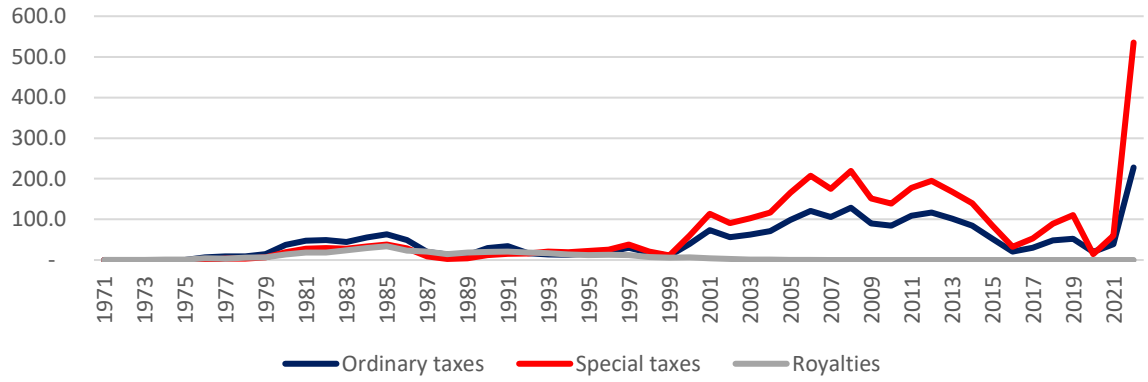
About 70 pct of normal production come from foreign owned companies. Of the remaining production capacity, 24 pct is owned by public companies of which 12 pct is owned by the State (Statkraft). The power is typically sold on long term contracts.

Gross income is generally calculated on the basis of spot market prices, but there are exemptions for long term agreements between independent partners. For these agreements gross income is assessed using the agreed contract prices. Apart from sales of electricity, onshore wind

power companies have also income from sales of green certificates and certificates of origin.

The development of the RR-taxes, corporate taxes and royalties (abandoned in 2005) from the oil and gas sector are illustrated in Fig.3.

Fig. 3. Ordinary taxes, special taxes (RR-taxes) and royalties in the Norwegian oil and gas sector 1971-2022, (Billion NOK). Source: Norskpetroleum.no



The development of the RR-taxes, corporate taxes and production taxes (the "natural resource tax") in power generation is illustrated in Fig. 4.

Fig. 4. RR-taxes, Corporate taxes, and production tax for Norwegian power generation 1997 - 2021 (million NOK). Source: Statistics Norway

External shocks and sensitivity of resource rent

The dip in resource rent and resource rent taxes in 2020 for electric power and oil and gas can be attributed to the Covid 19 pandemic. Furthermore, the sharply increasing resource rents and resource rent taxes for these sectors in 2022 can be related to the increasing prices resulting from the abrupt decline of Russian gas deliveries (the Ukraine war).

These observations illustrate how the reduced surpluses from excess supply and increased surpluses from excess demand end up where the scarcity is located, i.e., at the production sites for oil and gas and at the power plants.

Concluding remarks

Norway is rich in natural resources. Apart from the resources under consideration here, resource rent potentially exists also in forestry, quarrying and fishery. However, for all of these, calculated resource rents are not very high and there are long periods of negative rents. For agriculture, calculated resource rent is constantly and strongly negative (see, Dalen et al., 2023). The present size of Norwegian agricultural production can only be kept intact by continued large subsidies from the State.

The future of Norwegian rent generation is uncertain. In the longer time perspective resource rent from oil and gas production will fade off as renewable energy technologies take over (though it may last long before that is the case).

For power generation, the current huge resource rents generated, due to the scarcity created by the Ukraine War, may well fall as alternatives to Russian gas emerge. Also, the expansion of renewable energy generation in terms of offshore wind power farms, will further dampen the effect on Norwegian water power rents, although this is conditional on the size of the increase of electricity demand. However, the Norwegian installment of offshore wind power farms is only in its initial phase. While bottom fixed wind mills may be profitable in a somewhat longer time perspective, the profitability of offshore floating wind mills is highly uncertain.

Aquaculture thrives in Norwegian waters due to favorable water conditions in terms of nutritional richness, temperature, oxygen contents and currents. A large potential exists for expansion, but the sector is hampered by the struggle against pollution and fish diseases such as Infectious Salmon Anemia, Pancreas Disease, and AGD. Also, aquaculture is increasingly becoming an onshore activity. For this activity, there are currently no plans for resource rent taxation.

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