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The potential resource rent from Norwegian fisheries

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ABSTRACT

National wealth can be estimated via the System of National Accounts (SNA). According to SNA-numbers, Norwegian fisheries contributed negatively to the national wealth in the period 1984–2016 with exception of the years 2010–2011 and 2015–2016. Because all parameter values entering the calculation of national wealth are conditional on the existing management regime, the potential value of the natural resources may be concealed. This paper finds that this is the case for the Norwegian fishery sector. Using a numerical optimization model, the paper estimates the contra factual resource rent to be 1.6 billion USD if the fishing quotas were harvested efficiently with the currently available technology. This is 1.2 billion USD more than the observed resource rent in 2011 and means that Norwegian fisheries contribute to national wealth four times more than indicated by 2011 SNA-numbers. Hence, national wealth calculations based on official statistics may trivialize the role of natural resources.

1. Introduction

The World Bank [1] calculated the national wealth of nations and found that natural resource wealth in industrialized countries constituted an insignificant share of the countries' total wealth. In high-income OECD countries' natural resource wealth amounted to about 2% of the total wealth on average, and for some countries the share was zero, e.g. Japan. This finding suggests that the natural resources are unimportant for developed countries. On the other hand, developed country governments may use the natural resource management regime to reach other goals than maximizing the rents from the resource. That is, instead of collecting the resource rents and redistributing them to provide public goods, the management regime may be geared towards providing public goods directly without redistributing resource rents. This appears to be the case for the current Norwegian fishery regime, which seeks to balance the different goals and requirements of the Marine Resources Act (see Section 2). This paper seeks to uncover the implicit cost of using resource management policy to fulfil multiple goals. Specifically, this analysis seeks to answer the following question: What would the resource rent from Norwegian fisheries have amounted to if regulation of the resource only focused on cost efficiency in harvesting while maintaining sustainable fish stocks?

The resource rent is the extra income an entity obtains from having the right to utilize a natural resource. Here extra income implies returns above the normal return to investments. In natural resource economics the net present value of the sum of all extra future income equals the value of the resource. Preserving the value of the natural resources is closely connected to the notion of sustainable development. To preserve the value of a natural resource, the yearly harvest from the resource must be restricted in some way. If not, one risks over-utilizing the resource so that future generations are forced to harvest at lower levels. Controlling the harvest level does not by itself ensure that the value is preserved, at least not maximized. In addition, access to the resource must be regulated in such a way that it secures an efficient way of harvesting.[1]

Statistics Norway has calculated the value of Norwegian natural resources for several years based on data from the System of National Accounts (SNA) (see e.g. Alfsen and Greaker [2]). The resources included in the Norwegian SNA are the renewable natural resource sectors; agriculture, forestry, aquaculture, fisheries and hydropower, and the nonrenewable natural resources; oil, gas and minerals. The calculations show that except from aquaculture and energy related natural resources (petroleum and hydropower), Norwegian natural resources do not contribute to the country's national wealth. For instance, in the calculations for 2013, Statistics Norway [3] found that human capital comprised 72% of national wealth, while energy related natural resources and physical capital comprised approximately 9% and 13%, respectively. Financial wealth was about 6% of national wealth, while the contribution of the renewable natural resources; agriculture, forestry and fisheries, taken together was negative. Our hypothesis is that the current management regimes for these renewable natural resources conceal the true value of the resources. To investigate this hypothesis,

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[1] Section 5 elaborates further on management systems that ensure maximization of the resource rent in the fisheries.

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the paper starts with the Norwegian fisheries.

The development of the components of the resource rent in the fisheries over time from 1984 to 2016 are based on SNA. The resource rent was negative in all years except for 2010, 2011, 2015 and 2016. At the same time, the realized resource rent has gradually become less negative since 1984. Compensation of employees is the largest cost component affecting the rent of Norwegian fisheries, and this cost is much larger than the return on fixed capital and capital consumption. Total revenues in the sector have remained fairly constant, and the increase in resource rents seems to be mainly due to lower total costs of primarily labor and to a certain extent capital. Thus, the realized resource rent has increased mainly because of consolidation of the fishing fleet indicating that a greater share of the income from fisheries is distributed on fewer vessels and fishers.

To estimate the potential value of the Norwegian fisheries, this paper continues by calculating a contra factual value of the fishery resources given a cost-efficient management practice. This has been done for specific fisheries in other countries, e.g. Kroetz et al. [4] estimate how removal of restrictions can increase the resource rent in Alaskan sablefish and halibut fisheries. For Norway, this has previously been done by Hanneson [5], Steinshamn [6] for total fisheries, and by Asche et al. [7] for cod trawlers, but it appears that all three studies have used data that was collected before the Norwegian Structural Quota System was introduced. The Structural Quota System introduced trading in fishing rights to more vessel classes likely leading to further improvements in the efficiency of the fleet. Using a numerical optimization model, this paper maximizes the value of the Norwegian fisheries applying catch quotas, prices, costs and technology in 2011 as found in the Directorate of Fisheries [8]. 2011 was chosen because this was the year (together with 2014) with total allowable catch closest to the average catch over the period 2006–2016. The results indicate that the resource rent in 2011 could have been 1.2 billion USD higher than the realized rent. This suggests that there still is a large potential for efficiency improvements in the Norwegian fishing fleet.

Nordhaus and Kokkelenberg [9] state that there are many examples of how comprehensive economic accounts can bring economic benefits. These include “better estimates of the impact of regulatory programs on productivity, improved analyses of the costs and benefits of environmental regulations, and *more effective management of the nation's public lands and resources*” (page 15). To our knowledge, this paper is the first paper to compare resource rent calculations based on official statistics with the results of potential rents from a numerical model. Thus, the paper points to what might be a general problem with calculations of national wealth in developed countries: the value of the natural resources may be underrated. Moreover, if the resource rent in the fishery sector can be increased by reducing the number of fishers and vessels, there is per definition a situation with resource waste in the fishery sector as well as less value creation elsewhere as both human and fixed capital have an alternative value in other sectors (see Section 3). Underrating the value of a natural resource may have serious consequences. For instance, a low apparent value of a renewable natural resource over time could induce the Government to reduce their efforts into developing the management regime for the resource such that the resource is utilized in an unsustainable way. This may again imply that the Government sooner or later will have to reallocate other resources to reach its policy goals.

The issue of rent in fisheries has been discussed in general terms since the seminal studies of Gordon [10] and Scott [11]. According to [7] surprisingly little empirical work has been done to measure the magnitude of rent dissipation in fisheries. Apart from [4–7] there are a few other studies of fisheries resource rents in specific countries. Nielsen et al. [12] compare five different fisheries from Iceland, the Faroe Islands, Denmark, Sweden and Norway with respect to realized and potential resource rents. The Norwegian small-scale coastal fishery and the Swedish pelagic fishery stood out as the fisheries with the highest potential for efficiency improvements; 65% and 71% respectively. The paper by Andersen et al. [13] is another example from Denmark that studied the whole Danish fishery sector. They also base their estimation of resource rents on a numerical model and find that a reform of the Danish fishery policy could potentially increase resource rents by approximately 50% in the short run, and more than 100% in the long run.

Finally, the World Bank [14] estimates the potential resource rent from all fisheries in the world taken together. They also apply a numerical model, but unlike our model, their model also includes a biological growth function. Thus, while it is here assumed that current stock levels and catches are bio-economically optimal and that the focus only is on minimizing harvesting costs, [14] includes both the gains from having larger fish stocks and from a more efficient fishing fleet. First, they find that fish stocks should be allowed to grow by more than 100%. Second, in their model this does not imply higher annual catches, but more efficient harvesting. Their mean estimate of the global loss in resource rent is 50 billion USD. Maintaining an inefficient fishing fleet that fish on too small stocks is the major causes for the loss; the current global marine catch could be achieved with around half of the current global fishing capacity.

The rest of the paper is organized as follows: Section 2 describes the Norwegian policy regime, Section 3 provides an overview of how the resource rent is calculated using the SNA, and Section 4 presents the realized resource rent in the fisheries over the last three decades. Section 5 takes a closer look at the realized and potential resource rent in 2011, and Section 6 presents various sensitivity analyses. Section 7 discusses the results and Section 8 concludes.

2. The Norwegian policy regime

The Marine Resources Act of June 6th, 2008 states that “the wild living marine resources belong to the Norwegian society as a whole”. The act further states the following aims and requirements for Norwegian fishery policy:

i. a precautionary approach, in accordance with international agreements and guidelines,
ii. an ecosystem approach emphasizing habitats and biodiversity,
iii. an effective control of harvesting and other forms of utilization of resources,
iv. an appropriate allocation of resources, which among other things can help to ensure employment and maintain settlement in coastal communities,
v. an optimal utilization of resources, adapted to marine value creation, markets and industries,
vi. ensuring that harvesting methods and the way gear is used consider the need to reduce possible negative impacts on living marine resources,
vii. ensuring that management measures help to maintain the material basis for Sami culture.

Some of these requirements are conflicting. For instance, with point of departure in v) one may argue for individually transferable fishing quotas to ensure an efficient fishing fleet. On the other hand, an efficient fishing fleet may come into conflict with both iv) and vii) above. The Norwegian system for transferring fishing quotas is therefore restricted as is explained below.

In 2011, Norwegian fisheries had 10,220 full-time fishers, 2548 part-time fishers and 6250 vessels (Directorate of Fisheries [15]). Together, they landed approximately around 2 million tons of fish (excl. crustaceans, shells, seaweed and sea tangle). These numbers can be compared to the situation in 1984—the first year of our resource rent calculations. In 1984, Norwegian fisheries had 22,861 full-time fishers, 6767 part-time fishers and 24,078 vessels. However, their landings in tons were approximately the same as in 2011. The downward trend in the number of fishers and vessels is partly due to