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Focus on the economy of the Nordic fisheries

Case study reports from Iceland, Norway, the Faroe Islands, Sweden and Denmark

Nielsen, Max; Cozzari, Bruno Laursen; Eriksen, Guri; Flaaten, Ola; Gudmundsson, Eyjolfur; Løkkegaard, Jørgen; Petersen, Kari; Waldo, Staffan

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Max Nielsen, Bruno Cozzari, Guri Eriksen, Ola Flaaten, Eyjolfur Gudmundsson, Jørgen Løkkegaard, Kari Petersen, and Staffan Waldo

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Preface

”Focus on the economy of the Nordic fisheries - Case study reports from Iceland, Norway, the Faroe Island, Sweden and Denmark” the result of a study undertaken with financial support from the Nordic Council of Ministers. The Swedish Institute of Food and Agricultural Economics has also contributed with a Swedish case study. Initiator is the Nordic Committee of government officials on fisheries policy.

Results from the study are reported in the present report and in the main report “Økonomien i de nordiske fiskerier - fokus på ressourcerenten” (The economy of the Nordic fisheries – A focus on the resource rent). The main report is the common responsibility of all involved authors; where as the single country case studies in the chapters of this report are the responsibility of the single authors. Involved institutions are Institute of Food and Resource Economics (Denmark), Norwegian College of Fisheries Science (Norway), University of Akureyri (Iceland) and University of Lund (Sweden). The Faroese case study is made with assistance from the Faroese National Bank.

The focus of the report is the economic return of Society and the resource rent in selected fisheries in the five Nordic countries. The resource rent shows “*the return which is left to the remuneration of capital and labour corresponding to the level in other businesses*”. The size and allocation of the resource rent, including potential increase and reallocation is analysed. The analyses are based on methods in economics and on broad statistical material from the five countries.

The aim of this report is, along with the main report, to contribute to the public debate on the future of the fisheries sector in the Nordic countries. The target group is made up as politicians, the fisheries businesses and government officials. The results of the two reports were presented at the Conference ”Økonomisk forvaltning af fiskerierne” (Economic management of the fisheries), held at the Faroe Islands May 3-4 2006 by the Nordic Council of Ministers and the Faroese Ministry of Fisheries. This study is, however, made independently of the Conference.

In the study a Nordic language was compulsory for the main report. Danish was chosen. In this report, however, it was decided that the language should be optional. This means that three of the case studies are written in English (the Icelandic, the Faroese and the Danish), one in Norwegian and one in Swedish.

Responsible for the work is Research Director Jørgen Løkkegaard, while the coordinator is Associate Professor Max Nielsen, both from Institute of Food and Resource Economics. The Icelandic case was prepared by Associate Professor Eyjolfur Gudmundsson, the Norwegian by Professor Ola Flaaten and Guri Eriksen, the Swedish by Researcher Staffan Waldo and the Danish and the Faroese by Research Assistant Bruno Cozzari. Economist Kari Petersen provided assistance in the preparation of the Faroese case study.

January 2007

Søren E. Frandsen
Director

THE ICELANDIC TRAWLER FISHERY

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1. INTRODUCTION

The fishing industry is complex in a natural and social context. It is often difficult to identify the reason for certain developments within fisheries and how different management systems perform. This issue is studied in the present paper, where the purpose is to try to evaluate which management systems are most likely to create the conditions needed for the generation of resource rents. The Icelandic trawler fishery was selected since it has been operating under a relatively stable individual transferable quota management system since 1990 and also because there has been relative stability in technological development over the past decade.

It is now twenty years since an individual quota system was established in the Icelandic groundfish fisheries. What started out as an individual quota (IQ) system, for a trial period of one year, is today an individual transferable quota system, or an ITQ. The system itself has developed continuously over these twenty years and it is only in the last ten years that relative stability has been obtained in the legal framework for the quota system.

As expected there have been many controversies over the ITQ management system. The debate in the popular media has focused on the equity and distributional issues of the management system and to some extent the effectiveness of the system in rebuilding fish stocks. The debate on the improved efficiency and profitability of the Icelandic groundfish fisheries has not been conspicuous in the popular media, but for the most part restricted to academic literature. However, this paper focuses on the efficiency of the Icelandic trawler fisheries, measured in terms of resource rents, and how these resource rents are distributed between capital, labour and the public authorities.

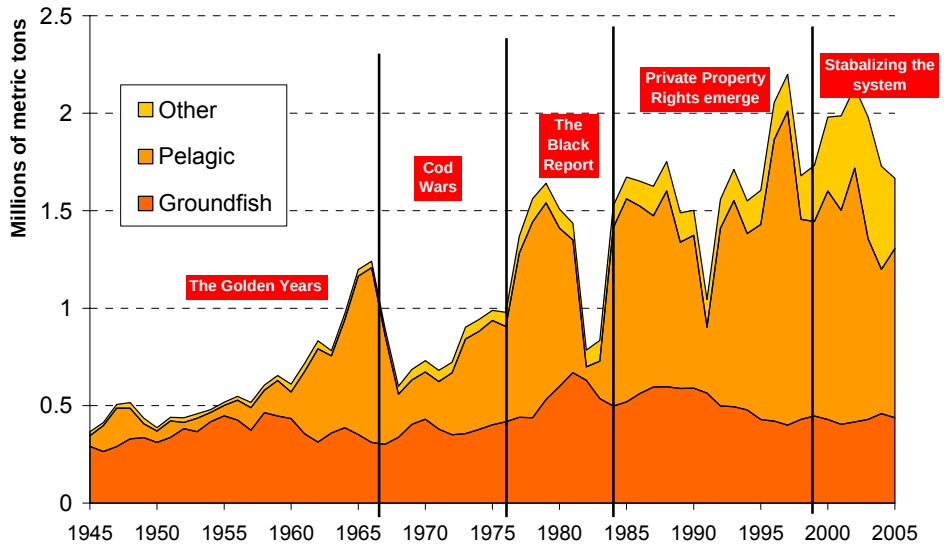
This paper begins with a general survey of the Icelandic fisheries and their management over the past decades and a specific overview of the Icelandic trawler fishery. Chapter 2 focuses on the details of the management system and Chapter 3 reviews the status of the major commercial fish stocks. Chapter 4 deals with resource rents in the Icelandic trawler fishery and tries to answer the question whether, or not, resource rents exist in that particular fishery. Chapter 5 includes discussion on the distribution of the resource rents. Chapter 6 then concludes this report by reviewing its major results, with additional discussion on the interpretation of data and future research.

1.1. Overview of the Icelandic fisheries

The literature relating to the Icelandic fishing industry has grown quite substantially over the past three decades. However, much of the academic and empirical research on the subject has been focused on specific problems rather than a general overview of the industry, with a few exceptions. Jonsson (1981) wrote a detailed account of the development of the Icelandic fishing industry prior to 1940. He extended his work to include the period from 1940 through 1984 (Jonsson 1984). Sections on the general structure and development of the Icelandic fishing sector, from 1984 through 1999, can be found in several publications. These include Arnason (1995), Hannesson, (1996) and Runolfsson et al. (1999).

Icelandic fisheries developed rapidly after 1945. Figure 1 below shows the catch from 1945 to 2005, identifying five different phases; "The golden years", the Cod wars, the Black report, the emergence of private property rights and the stabilization of the management system. The catch is categorized as groundfish, pelagic and other fish species. The four major species in the groundfish category are cod, haddock, saithe and redfish. The pelagic category contains herring and capelin. The herring represents most of the pelagic catch from 1945 to 1969, but after 1969, the pelagic catch is mainly capelin. Commercial harvest for capelin started in the late 1960s. The other category also includes blue whiting, a species which Icelandic vessels started to harvest commercially in the late 1990s.

Figure 1. **Total catch by Icelandic vessels and categorised by type of fisheries in all fishing grounds from 1945 to 2005. Red boxes refer to specific periods in the development of Icelandic fisheries.**



Source: Data from the Icelandic Statistical Bureau in own presentation.

The period between 1945 and 1967 is often called "the golden years" or the "herring" years, referring to a huge expansion in the herring fisheries off Iceland. Several innovations and technological advantages, along with increased demand for fishmeal and fish oil, and large markets for cured herring in the Soviet Union, Sweden and Finland, contributed to a large expansion in the Icelandic herring fishing fleet. The catch came mainly from two stocks, the Icelandic spring herring stock, harvested in local waters and the Icelandic-Norwegian herring stock harvested off the eastern part of Iceland, and in Norwegian waters. These stocks completely collapsed in 1967-1968, leading to a considerable economic depression in Iceland (Jonsson 1984).

During this same period, the Icelandic demersal fisheries were developing, but remained less profitable than the herring fisheries. The majority of all economic benefits from fishing came from the herring fisheries during those years.

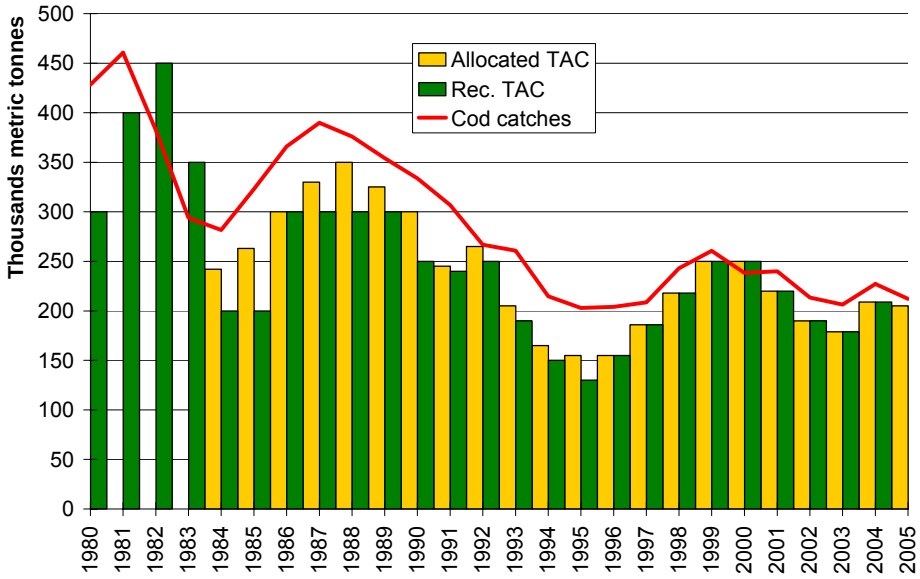
There were several reasons for the lack of profitability in the groundfish fisheries at the time. Decreased prices for fresh products in the U.K. (due to lower demand and higher tariffs), use of inefficient equipment, and domestic economic policy, which was centralized at the time and favored the herring fishery, have been pointed out as possible explanations (cf. Jonsson 1984). This changed, however, when the herring fisheries collapsed in the 1960s.

After the collapse of the herring fisheries, demersal species became more important. Previously Iceland had expanded its exclusive economic zone from 4 to 12 miles in the 1950s, banning all trawlers, both Icelandic and foreign, from fishing within that zone for any species. In 1970 Iceland expanded its EEZ to 50 nautical miles, and in 1975, expanded the EEZ to 200 nautical miles. This time the objective was to gain control of the fishing grounds in order to be able to manage total catch from Icelandic waters, specifically the cod stock which was found to be declining during the 1970s.
At the same time, the new stern trawlers were introduced to the Icelandic fisheries. Those vessels were better suited for trawling, and were designed as wetfish trawlers. Their primary role was to supply onshore processing plants with a stable year-round supply of raw material.

The period between 1970 and 1980 is, therefore, one of expansion where new fishing techniques were introduced into the Icelandic demersal fisheries, while foreign fishing vessels were banned from fishing within the new 200 nm exclusive economic zone. The markets in the U.S. and Europe expanded during the period; especially the wet-fish markets in the UK due to the lack of domestic supply after the British were chased out of the Icelandic fisheries. Icelandic catches of demersal species increased from 422,000 tons in 1970 to 670,000 tons in 1980.

In 1976, the so-called "Black Report" was issued by the (Icelandic) Marine Research Institute. This report warned that too much effort was being used for harvesting cod. A collapse was inevitable, unless the fisheries were brought under control. Despite the biologists' warnings, the fishing fleet and catch continued to increase. The new vessels were mostly financed by support from the government, either indirect or direct. The results of a high fishing effort were soon realized and by 1983, a sharp decline in cod landings was evident.

Figure 2. Cod landings, allocated total allowable catch (TAC) and recommended total allowable catch for Icelandic fishing grounds 1980 - 2005



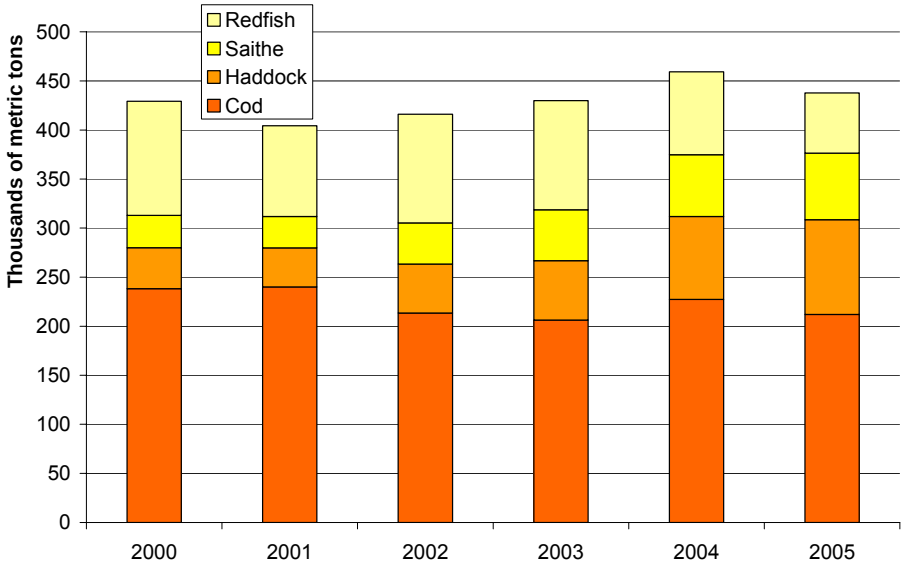
Source: Statistics Iceland, Marine Research Institute, Útvegur 1980 - 1997.

Figure 2 shows total cod landings for all vessels from 1980 through 2005. Record landings in 1980 and 1981 are due to increased effort in terms of a larger number of vessels (trawlers) as well as the size and efficiency of fishing vessels. The sharp decline from 1981 through 1983 is evident, since during those years the fishing fleet was not able to catch the allocated total allowable catch (TAC). The increased catch from 1984 through 1987 is due to strong recruitment based on larger than average year classes from the early 1980s. This led to higher quotas, but was also caused by increased efforts when a large portion of the trawler fleet elected to operate under a days-at-sea system rather then the ITQ system. This resulted once again in higher catches than recommended by biologists at the Marine Research Institute. It was not until the 1990s that the catch was really brought under control, and at that point, loopholes still existed, resulting in higher cod catches than recommended, though the scale was much lower than in previous years. Starting in 1991 quotas were allocated on the basis of a fishing year (from September through August the next year). Holders of quotas could also move a small percentage of their quota between fishing years, or transfer that same percentage to another species. Although these allowances were

small, they caused allocated quota and actual catch to differ to some degree. Catch is also registered on an annual basis causing some discrepancies from the allocated TAC on the fishing year basis.

In 1995 the Ministry of Fisheries started to use a catch rule where the total allowable catch is calculated based on a predetermined rule. Hence recommendation and allocated TAC match perfectly after 1995. Starting in 1999, the catches are relatively stable and start to conform almost perfectly to the total allowable catch. In fact, when looking at overall groundfish catches for the 4 major species (cod, haddock, saithe and redfish) from 2000 through 2005 one notes that the catch ranges from 400 - 450 thousand metric tons annually, as shown in figure 3 below.

Figure 3. Total groundfish catch (MT) in Icelandic waters from 1995 - 2000, all fleet segments.



Source: Statistics Iceland

Of the four species. cod is the most important one in terms of value. The cod catch declines throughout the period, or from 230 thousand metric tons town to 205 thousand metric tons. Haddock and saithe increase,while redfish catches are reduced from over 100 thousand metric tons in 2000 down to little more than 60 thousand metric tons in 2005.

In the late 1970s and early 1980s the fishing grounds around Iceland were mostly harvested by Icelanders. This created a much easier environment for the government to manage the fisheries. At the same time, a huge expansion in the Icelandic fishing fleet was being fueled by the Icelandic government, and although catches kept going up, the biologists continued to warn of ever-increasing over-harvesting, especially with regard to the cod stock.

Between 1982 and 1983 the now important capelin resource collapsed. At the same time, the cod fishery was in decline. In 1982 and 1983 fishermen were unable to harvest the total allowable catch of 450,000 and 350,000 MT of cod, respectively. The total catch in 1982 was 388,000 MT and 292,000 MT in 1983 (Útvegur 1983). Export prices for cod products decreased both in 1982 and in 1983 (Útvegur 1984). By the end of 1983, the outlook for the Icelandic fishing industry was grim.

It is in this environment that Icelanders started to experiment with individual quotas, i.e. where the total catch is divided up among the participants in the fishery. These measures were considered temporary or seen as an experiment while fisheries management methods were being developed (Hugason 2001).

1.2. The Icelandic trawler fishery

In the 1970s a rapid build up of stern trawlers took place with financial support from both national and local governments. The stern trawlers represented a modernization of the old side-trawlers and were much more efficient and larger than vessels used before. The number of stern trawlers grew steadily until 1990 when there were 115 registered trawlers. After that the number of trawlers started to decline and in 2005 there were only 65 registered trawlers. At the same time, the average size in GT and kw per vessel has increased. Hence today there are fewer but larger vessels in the trawler fleet.

The trawlers use standard bottom trawls with a mesh size of 135mm to harvest groundfish species, such as cod, haddock, saithe, Greenland halibut and redfish. The total groundfish catch and the share of main species are shown in table 1 below.

Table 1. Key statistics on the Icelandic trawler fleet from 2001 – 2003				
	2001	2002	2003	Average
Number of man years	1.418	1.510	1.494	1.474
Number of trawlers	80	76	71	76
Tonnage (BT)	79.413	80.718	77.064	79.065
Engine power (KW)	144.540	143.239	136.590	141.456

Source: Statistics Iceland and Crew Registrar (Icel. Lögskráning)

The table reveals that from 2001 through 2003 the average number of man years used in the trawler fleet was 1474. These numbers are based on the Official Registrar of fishermen crews (Icel. Lögskráning). All crews on larger fishing vessels, including trawlers, must be registered with the authorities before the vessels leave port. These registrations are then used as official records for crew members to register their time at sea for tax purposes as well. The number of man years in the table above, therefore, shows registered days at sea. In the trawler fleet, 3 fishermen usually share two positions on board. That is, the crews rotate, going fishing for two consecutive fishing trips and are then on shore for one fishing trip. Hence it is possible to estimate that behind those 1500 man years, on average, from 2001 – 2003, there were 2100 different fishermen with fulltime employment in the trawling fleet. In 2004 – 2005 there is a sharp decline. During this same period, total catch in the trawler fleet was similar to the period between 2001 and 2003. However, the reduced number of man years is consistent with the reduced number of trawlers, from 80 vessels in 2001 to 65 vessels in 2005.

In 2001, 80 trawlers were registered in the official ship register. These are both wetfish and factory trawlers. Some of these trawlers were inactive at the time but no official statistics have been collected on the numbers of trawlers that are inactive at any given time. The total GT for the fleet remained relatively stable at around 80,000 GT from 2001 through 2005, while engine power decreased from 145 thousand Kw to 130 thousand Kw.

For each day at sea fishermen receive a special tax allowance (around ISK 700 per day from 2001 through 2003) which is deducted from their income tax. Each day is multiplied by a factor of 1.49; hence a fisherman who goes fishing 245 days a year gets fisherman allowance for a total of 365 days per year. Using the above information it is possible to estimate the total fishermen's allowance for the trawler fleet be-

tween 2001 and 2003. Table 2 shows the calculations. It must be emphasized here that these are estimates of the true deduction.

Table 2. Estimated total fishermen's tax deduction for the trawler fleet.

	2001	2002	2003
Fishermen's deduction per day (ISK)	691	712	728
Estimated tax-days deduction per year (1,000 days)	77	82	81
Total deduction for all trawler fishermen (Million ISK)	533	585	592
Total deduction for all fleet segments (Million ISK)	1,225	1,209	1,254
Share of the trawler fleet in total deductions	44%	48%	47%

Source: Own calculations based on offical tax information and information from the Official Crew Registrar

The table shows the standard deduction per day in Icelandic kronur. This amount increased from 691 ISK per day in 2001 to 728 ISK per day in 2003. The next line shows the total number of estimated tax deduction days. This is estimated as the total number of registered days at sea (see table 1) times 1.49, which is a coefficient given by the tax authorities. This factor compensates fishermen for those days which they are employed with the fishing company but not at sea, since most fishermen share each position, i.e. three fishermen usually share every two positions on board. In other words, they go fishing for two trips and then stay on shore for one trip, though still officially employed by the fishing company. By multiplying line 1 and line 2 we get an estimate of total eligible fishermen's deduction for the trawler fleet. The last item in the table shows the trawler deductions as a share of the official total fishermen's deduction for all fishing fleets. The trawler fleet has about 46% of the total deduction for all fleets which gives some credibility to this estimate since the total catch value of the trawler fleet is about 42% of total catch value for all fleets and the trawler fleet employs almost 50% of all fishermen in Iceland.

Table 3 shows annual total catch, and value, for all species from 2001 through 2003. The table shows that total catch volume has increased from 345 thousand metric tons to 392 thousand metric tons, with value remaining almost the same in nominal terms. The growth in catch is mostly due to increased landings of haddock and saithe, since the abundance of both of those species has increased considerably in the past few years. The total cod catch has remained relatively stable in terms of volume (a slight increase) and value (slight decrease).

Table 3. Value and volume of total catch for the trawler fleet, 2001 - 2003				
Landings by species (MT)	**2001**	**2002**	**2003**	**Average**
Cod	84,796	79,290	80,396	81,494
Haddock	13,882	20,999	23,033	19,305
Saithe	19,636	30,320	39,049	29,668
Redfish	84,240	102,242	102,913	96,465
Other groundfish	33,478	32,631	42,191	36,100
Other species (Pelagic and crustaceans)	108,754	106,276	120,051	111,694
Total catch volume	344,786	371,759	407,633	374,726
Landing value by species ('000 ISK)	**2001**	**2002**	**2003**	**Average**
Cod	11,092,670	10,747,499	9,486,863	10,442,344
Haddock	2,060,076	2,951,080	2,177,540	2,396,232
Saithe	1,249,456	1,893,677	1,947,918	1,697,017
Redfish	7,063,461	8,546,410	7,108,146	7,572,672
Other groundfish	4,227,347	4,482,116	3,924,170	4,217,483
Other species (Pelagic and crustaceans)	3333545,1	3765143,2	3271161,1	3,339,877
Total catch value	29,026,555	32,385,925	27,915,798	29,424,037
Share of total catch volume	**17%**	**19%**	**19%**	**19%**
Share of total catch value	**41%**	**42%**	**42%**	**42%**

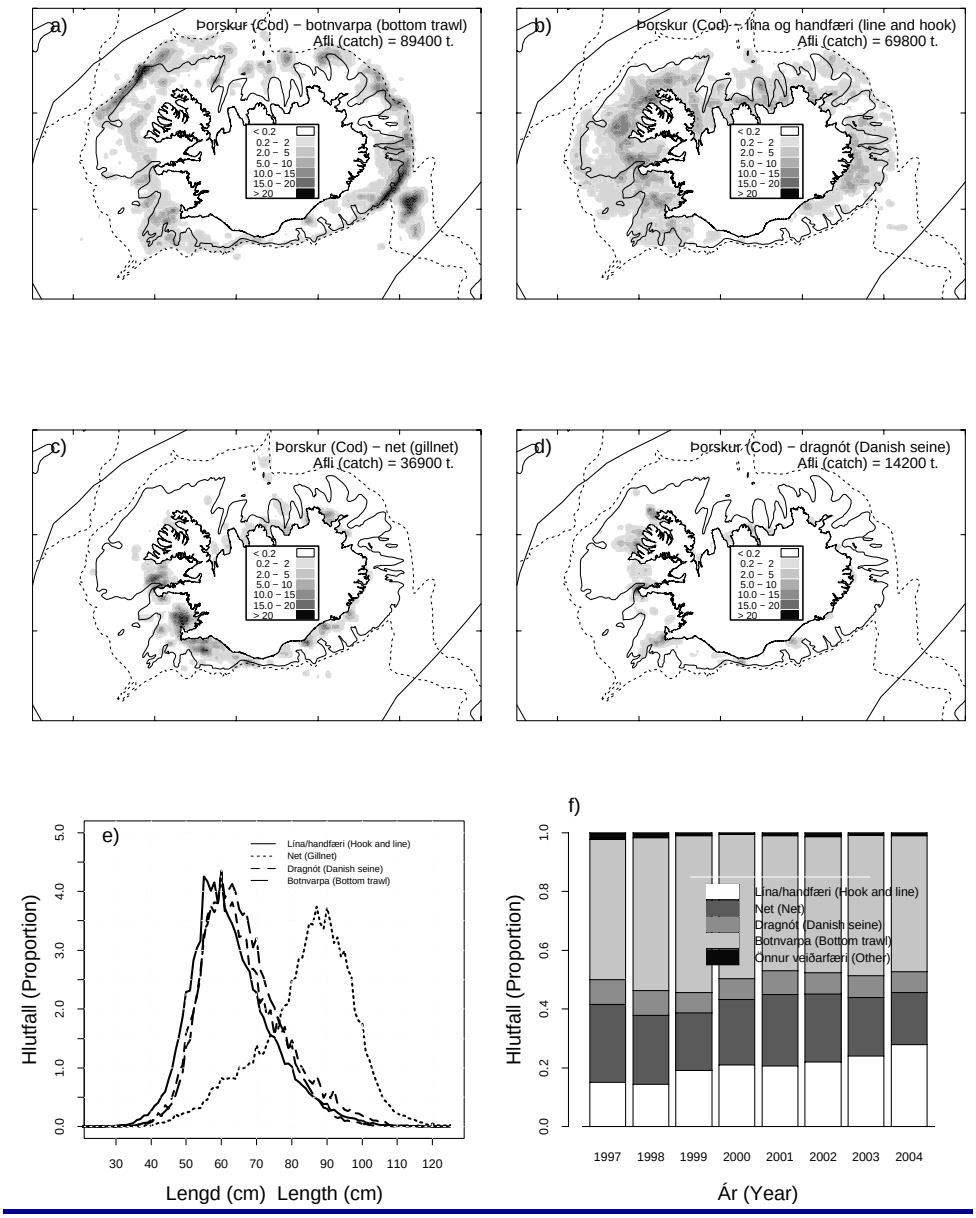
Source: Statistics Iceland

The decrease in value is due to the strengthening of the Icelandic currency, the krona. In fact, prices in foreign currencies have actually been increasing. From 2000 until 2004 the average export value, measured in XDR, for all seafood exports increased annually by 1.27%. However, the increase in the value of the Icelandic krona has offset those price increases. The rise of the Icelandic krona is due to new investments in other sectors and private consumption which has led to an influx of foreign capital into the Icelandic economy.

The importance of the trawler fishery for Iceland can also be seen from table 3 above. The fleet has an average of 18.8% of the total catch volume in 2001 through 2003 which constitutes more than 42% of the total catch value. And of that cod accounts for about 1/3 of the total value.

Groundfish species are caught in Icelandic waters all around the island. The richest fishing grounds are in the north-west, west and south-east of the island. The distribution of the catch for cod is shown in figure 4 below.

Figure 4. Catch areas, average length and relative share for cod catches by gear type



Source: Marine Research Institute

2. Management of Icelandic Fisheries

2.1. Management Prior to 1984

The first law concerning utilization of fisheries resources can be found in the "old law" of the Icelandic Commonwealth (Icel.: Grágás) which dates back to medieval times. This law covered harvesting by shore-based methods, and the jurisdiction landowners had over the coastal waters. Overall, the open ocean was for everyone to use (Durrenberger et al. 1987).

The first modern laws for the Icelandic fishing-sector date from the mid-to-late 19th century. Under this series of laws, local authorities were given the right to set rules and regulations on harvesting in coastal waters, and rules on the processing of the catch. These laws generally covered harvesting and processing methods in order to help increase the value of the catch, and to protect local harvesters. Some of these laws are still in place today.[1]

The economic inefficiencies of Olympic style fishing became clear to Icelandic fishermen before biological overfishing was a real concern to them. In the early 1930s, congestion on the fishing grounds southwest of Iceland was becoming a problem. Better technology allowing for longer lines to be laid and for the boats to go further from their own homeport was creating congestion in the best local fishing grounds when fishermen from more than one fishing port could set their lines in the same fishing area. This led to voluntary self-imposed regulations as to when vessels were allowed to sail for the fishing grounds. These regulations later became laws, and versions of those laws are still in place today (for more details see Durrenberger et al. 1987).

Overfishing became a concern among scientists and fishermen alike. They all realized that with multinational fleets harvesting the fishing grounds, chances of cooperation for protecting stocks were slim. Foreigners became an easy target, since they were the ones depleting the resource, according to Icelanders. The fisheries laws and regulations between early 1900 and 1948 were all aimed at getting the foreign fishing

[1] An example are the "Lög um bátfiski á fjörðum." Nr. 6, 19. Júní 1888 (e. "Laws on fishing in fjords." Own translation of title.)

vessels away from Icelandic waters. At the minimum, they were set to limit inshore and close-to-shore harvesting by foreign vessels in Icelandic coastal waters.

The major turning point for Icelandic fisheries management came in 1948 when Althing, the Icelandic Parliament, voted in laws that required the management of the Icelandic fisheries resources to be set on a scientific basis (Althing, Act No. 44, April 5, 1948).

Based on the Act from 1948 Iceland expanded its exclusive economic zone in incremental steps. The table below shows the year and extent of each expansion. The final expansion came in 1975 when the EEZ was moved from 50nm to 200nm miles, causing tension between two NATO allies, Iceland and United Kingdom.

The Act from 1948 also changed the approach to fisheries management. Based on research by government scientists and in cooperation with international organizations such as ICES, the government started to use area closures, restrictions on mesh sizes and bans on trawling in coastal waters and sensitive nursing grounds.

From the 1950s through the 1970s the fisheries management in Iceland was based on effort control and limitation of entry of foreign vessels. Domestic vessels had de facto open access to all major fisheries. The major stepping points in the development of the Icelandic fisheries management system are listed in table 4.

Table 4.	Major events in Icelandic fisheries management
Year	Event
1948	Law that emphasizes Icelandic jurisdiction over fish stocks in Icelandic waters, and that the management of those stocks should be on a scientific basis
1952-1972	Exclusive Economic Zone Expanded to 50 NM
1965-1975	Initial steps using effort control, total and producer quotas for controlling catch. Harvesting moratorium on herring.
1975	The "Black Report" issued by the Marine Research Institute. EEZ expanded to 200nm.
1976	De-facto recognition of Icelandic authority over 200nm EEZ by the British Government
1976	Protection of juvenile fish through temporary area closures. Total catch quotas for cod.
1977	Individual Effort Restrictions in the demersal fisheries
1983	Individual Vessel quotas to be implemented in 1984 for one year. Quota shares based on catch history from 1981 through 1983.
1985	The Individual Vessel quota system extended for one year. Effort quotas introduced as an alternative.
1986	Individual Vessel Quotas extended for two years
1988	Another two year extension for the Individual Vessel Quota system. Transferability for quota shares made easier. The effort Quota system is still in place as an option. A new Fisheries Act is passed where it is emphasized that the Icelandic fishing grounds are the common property of the Icelandic nation.
1990	New fisheries management law passed, this time without any time limits on the allocation of share quotas. Quota shares are divisible and fully transferable. Effort quota system discontinued. A new system takes effect on January 1st 1991.
1993	Government committee recommends the ITQ system to be kept in place, indefinitely.
1998	The Supreme Court rules that only granting fishing licenses to vessels that were fishing between 1981 and 1983, or replacement vessels for such vessels, is unconstitutional. The Supreme Court explicitly states that they are not ruling on the distribution of quota shares.
1999	An amendment to the fisheries management law grants the authority to issue licenses to fish to all Icelandic citizens. The distribution of quota shares is not affected and fishing without a quota share is illegal.
2000	The Supreme Court rules that fishing without quota is illegal, putting an end to a dispute that started with the Supreme Court ruling from 1998. The verdict strengthens the legal basis of the quota system.
2002	A resource rent tax becomes part of the fisheries management law, to be implemented by the fall of 2004.
2004	The last fleet segment (boats under 6 GRT) is changed from a days-at-sea system to a ITQ based management system.

Source: Adapted and extended from Arnason (1995) and Helgason (1995)

2.2. The Birth of Private Property Rights 1984 - 1990

In the early 1980s, it became clear to the fishing industry that the management system in place would not rebuild the cod stock in Icelandic waters. Although foreigners were out, the Icelandic fishing fleet kept expanding, often with government loans and other financial incentives from the government.

In the wake of declining catch of demersal species, the fishing industry, through an annual meeting of the Icelandic Fisheries Association, asked the government to estab-

lish a legal framework, allowing the Minister of Fisheries to establish an individual vessel quota system for the management of demersal fisheries. The request was made in the beginning of December 1983, the law was passed on December 22, and the new legislation was implemented by January 1, 1984 (Runolfsson 1996, Hugason 2001). Under this new fisheries management system all vessels over 10 gross registered tonnages (GRT) had to operate under a total allowable catch system, either through vessel quotas on catch or through number of days at sea fishing. Under the individual quota (IQ) system, individual vessels were allocated a certain percentage of the total allowable catch for that category, for the days-at-sea (DS) system each vessel was allotted a total number of days fishing for specific species. The initial allocation was based on a three-year catch history (November 1980 - October 1983) where the individual quota was allocated to each vessel. Both these systems were superimposed onto the current management system which included mesh size restrictions, area closures and gear restrictions. In addition, some restrictions and loopholes existed within the IQ system, such as a 10% penalty (every kilogram landed counted as 1.1 kilogram towards the vessel quota) on fish caught in Icelandic waters landed in foreign ports, and a doubling of quota for vessels using longline to harvest (every kilogram landed from longline fisheries counted as 0.5 kilograms towards the vessel quota).

It is important to note that the initial system was only set for one year. The system was reinstated in 1985, more or less based on the initial allocation from 1984, even though some redistribution occurred between different vessel categories.

In 1985, fisheries management using IQ and DS systems was reinstated for two years (1986 and 1987). During 1985, 26 trawlers elected to be under the IQ system and 80 elected to operate under the DS system. Overall 277 vessels were under the IQ system and 365 vessels were under the DS (Útvegur 1986). The system was reinstated in 1988 for two years (1988-1990) without any significant changes.

The period from 1984 through 1990 can be seen as an evolution period for the current Individual Transferable Quota system. All players within the system (fisheries managers, vessels owners, fishermen, etc.) learned by doing, and in the process some gained and some lost. It was seen as a crucial point, in order to increase efficiency in the Icelandic fisheries, that uncertainty of the ownership of the harvesting rights (the ITQ share) be minimized. Experience from the IQ system, as well as the ITQ system in the capelin and herring fisheries favoured a private property right system to be implemented in all Icelandic fisheries. In 1990, Althing passed a law implementing an

ITQ system in all major fisheries within Icelandic waters, under one set of principal rules and regulations, to take effect from January 1, 1991[2].

2.3. Icelandic Fisheries Management 1991 to the Present

Several significant changes in the management of the Icelandic fisheries occurred under the new fisheries management legislation from 1990. This included separating the statistical year for quota holdings from the calendar year, to begin on September 1 and end on August 31 the following year. The days-at-sea system was abolished for all larger vessels, and vessels between 6 GRT and 10 GRT were offered to enter a separate ITQ system, or a temporary hook and line system (1991 - 1993), where vessels were only allowed to fish with hook and line on specific days of the year (Runólfsson 1999, *Útvegur 1990-1997)*.

Over the next few years, several regulations were issued to implement the fisheries management laws from 1990. These regulations dealt with the renewal of fishing vessels, reducing the loopholes in the system, such as abandoning the regulation which allowed for doubling the quota if it was caught using longlines (in 1996), and regulations for the small-scale inshore fleet. Overall the actions taken during this period have had two general goals: first to force the total catch to coincide with the total allowable catch, and second, to respond to ever-increasing criticism of the distributional effect of the quota system.

In 1996 a local fisher applied for a license to fish, along with a substantial amount of groundfish quotas. The individual was denied the license, and quotas, on the ground that fishing vessels, not individuals, are issued with licenses. The case went to the Supreme Court in Iceland in 1998. The Supreme Court ruled in favor of the individual. The court ruled that restricting licenses to vessels that were in the system in 1983 was unconstitutional (Palsson 1999). The court explicitly stated that it was only ruling on the issue of a license, not the quota. Hence, after the verdict, the Icelandic government had to issue a license to all individuals interested in obtaining a commercial-fishing license. However, the government still required a quota in order to be allowed to land fish in port.

[2] Hugason (2001) provides detailed analysis of the institutional and political background, and development of the Icelandic quota system.

Another individual decided to challenge the quota requirement, and went fishing without a quota. He was charged with illegal fishing. The municipal court did not find him guilty of illegal fishing, in part based on the Supreme Court verdict from 1998. This case went before the Supreme Court in February of 2000 and the Supreme Court gave its verdict in April that same year. This time the Supreme Court ruled[3] that it was legal to limit fishing by a system, such as the quota system. This strengthened the legal ground for the quota system.

The developments described above have had a significant impact on the management of the Icelandic fisheries. The current situation is as follows.

The first article of the fisheries management law states that all ocean resources are the common property of the Icelandic nation. The objective of the law is to promote efficient and sustainable use of the resources, in order to enforce employment and livelihood in the country. It explicitly states that the rights to harvest those resources does not give the holder property rights over them, and that the government can recall the harvesting rights. Fisheries are allocated a total allowable catch, which is then divided among those who hold the right to catch the specific species. These harvesting rights, or quotas, are divisible and transferable, both on an annual basis and in perpetuity. There are limitations on how much individual companies can hold. In groundfish, no individual or legal entity can hold more than 10% of the quota for each species.[4] The Minister of Fisheries sets the annual total allowable catch, based on recommendations from fisheries scientists and usually includes discussion with user groups within the fishing industry. The Ministry of Fisheries is responsible for implementation and enforcement of the Fisheries Management Act. Every year, various regulations are issued in order for the fishing industry to comply with the requirements of the Act e.g. specifications regarding mesh sizes, closure of sensitive areas, regulation on how to weigh the catch, etc.

[3] As an example of how important this issue is to the Icelanders, the Supreme Court comprised 7 justices, as compared to 3, or 5 justices in other cases. The court did not reach consensus, and hence the majority ruling (4 out of 7) stated the verdict.
[4] For the fishing year of 1998/1999 this was not a binding restriction since the largest company held less than 6% of total groundfish quotas at the time.

2.4. The Use of TAC Rules in Icelandic Fisheries Management

A unique feature of the Icelandic fisheries management system is the use of a TAC rule for determining the annual quota for the most important species, cod. The Icelandic Minister of Fisheries requested a proposal from the Marine Research Institute on how fish stocks should be harvested in order to achieve maximum (economic) yield over the long-term. The Marine Research Institute (MRI), in cooperation with the National Economic Institute (both of Iceland), established a working group to answer the Minister's request (Danielsson et al. 1997).

The unique feature of the Icelandic catch rule is not the rule itself, but how it was derived. Several technical articles have been published based on the work of the joint working group of the NEI and MRI (Baldursson et al. 1996, Danielsson et al. 1997.) In order to find the optimal way of utilizing the Icelandic cod stock, the working group used bioeconomic modeling and optimization techniques to come up with a long-run equilibrium for the optimal stock size. The group then used a simulation method in order to find the "best" path of annual catch quotas to reach the optimal stock size.

The optimization process indicated that the most economical spawning stock biomass is about 820,000 MT, out of a total fishable biomass of 1,600,000 MT. An interesting observation is that the most economical optimization path would be to stop harvesting cod for two years, and then gradually start increasing the annual quotas after that. This confirms research done by Arnason (1980) where he showed that the most economical way of rebuilding the fish stocks would be to cease all fishing for a period of time, and then gradually increase the annual TAC. So more than ten years later, the Icelandic government is faced with the same recommendation; a drastic cut in the total allowable catch for the Icelandic cod stock, the single most important species of all the Icelandic fisheries.

Baldursson et al. (1996) and Arnason (1980) noted that, though economically optimal, a moratorium on cod fishing might not be socially feasible. Hence, both suggested a minimum catch that would balance short-term economic profits versus long-term sustainable use of the resource. The MRI and NEI working group used a social utility function, constrained by economic and biological factors, to find the optimal path for total allowable catch that allowed the fish stocks to grow fairly rapidly.

The biological model used is similar to the one used by the MRI. It is a version of the Beverton-Holt model, which uses multiple cohorts and age structure analysis. It was also assumed that recruitment is related to the spawning stock biomass (SSB) (Baldursson et al. 1996). The simulations indicated that even under a low level of risk aversion, there should be a drastic cutback in total allowable catch, or around 100,000 MT annually, slowly increasing towards 350,000 MT in 2003, or eleven years later.

The final recommendation by the MRI/NEI group therefore used rational arguments based on the simulation results that the total allowable catch should be set as the average of 25% of the total harvestable biomass and the previous year catch. The minimum TAC was suggested as 155,000 MT and the maximum TAC would be 450,000 MT. The government adapted the 25% rule and the min/max TAC settings, but abandoned the idea of using the average catch between the last year and the recommended TAC. The Fisheries Minister changed the rule in the spring of 2000 by ordering that annual changes should not be more than ±30,000 MT.

In the latest assessment of the cod stock, the Marine Research institute pointed out that the harvest rule needed to be changed (Hafrannsóknastofnunin 2005). The institute has pointed out that due to various factors the buildup of the stock has been slow. In order to allow for a faster buildup the harvesting rule should allow for 20% of the total harvestable biomass to be harvested rather than 25% as it is now.

2.5. Management of the trawler fleet – current situation.

The management of Icelandic fish stocks is based on output control (individual vessel quotas). According to the fisheries management law from 1990 the Minister of Fisheries sets annual total allowable catch (TAC) for all species harvested within the Icelandic EEZ. The TAC must be set after the minister receives advice from the Marine Research Institute (MRI), but the wording of the law does not require the minister to comply with the MRI, a fact which several ministers of fisheries have utilized over several decades. The TAC for the cod stock is set according to the quota rule as described in the previous section. Total Allowable Catch for other demersal species is set directly by the minister for a period of one fishing year, which starts September 1st and finishes August 31st next calendar year.

Anyone who wants to fish commercially must obtain a fishing license. Fishing licenses are issued to an owner of a legally registered fishing vessel, and are valid for a

period of 12 months, after which the owner must re-apply. Fishing licenses are not issued to foreigners, since foreign ownership of fishing vessels is restricted by law[5]. The total allowable catch is divided into quota shares (in percentages) by boat. The quota shares are dividable and can be traded among those who hold a fishing license. Some restrictions and limitations are in place for the quota trade. The quota for each vessel is based on last year's holdings of that boat plus any changes during the last fishing year[6].

There is also limitation on quota holdings for each individual or legal entity. Each vessel can hold no more quota than the vessel can "obviously" harvest within a fishing year. The exact wording in the legal text is vague, and no quantities or percentages are given to help define what is "obviously" too high a quota holding per vessel. In addition, the total quota holdings by an individual, legal entity and/or related individuals or through indirect ownership can never exceed a certain percentage of the TAC for a given species. This percentage differs for individual species as is shown in the table below.

Table 5. Maximum share an individual or a company can hold

Species	Maximum quota share holdings by related individuals or companies
Cod	12%
Haddock	20%
Pollock	20%
Redfish	35%
Greenland Halibut	20%
Herring	20%
Capelin	20%
Deep water Shrimp	20%

Total quota holding by related individuals or companies cannot exceed 12% of the overall TAC for all species, as measured in cod equivalent values[7]. Each fishing vessel must fish 50% of its own quota over a period of two years. If a vessel fails to fish this share of its own quota, the remaining quota will be reissued to other vessel owners. This restriction was put in place in order to control the lease market and minimize speculative trading. There are also restrictions on how much can be transferred

[5] Law nr. 22, April 8th 1998

[6] For more detailed information on the initial allocation of quota to fishing vessels see. Matthiasson (2003)

[7] Cod equvalent values are used to measure relative value of any species to cod prices. These values are calculated by the Fisheries Directorate and are based on last year's relative prices between species.

from a vessel within a given fishing year. In any given fishing year no more than 50% of the total quota holding of an individual vessels can be transferred (leased or sold) to another vessel.

A resource rent tax or fee is charged to those that hold quotas. This fee is put in place in order to capture some of the resource rent generated in the fishery. The fee is based on the total catch value for all fisheries, subtracting the entire purchases of ship fuel and an average measure of other costs as well as wage costs of 39.8% of total revenue. This is assumed to measure changes in the resource rent (note that there are no direct capital costs) and the holders of quota must pay 9% of this difference (the 9% does not take full effect until 2009). Between 2004 and 2009 the tax gradually increases from 6% - 9%. The difference is then divided by the cod equivalent value of all TAC for the given fishing year. In the fishing year 2004/2005 the fee was 1.99 ISK per cod equivalent kilo. In the 2005/2006 fishing year the fee was reduced to 1.53 ISK per cod equivalent kilo due to higher currency rates, and hence lower revenues in Icelandic kronur, and higher fuel costs.

There are several technical restrictions in place for trawlers, both general and specific laws and regulations. Minimum mesh size for trawl nets is 135mm for all demersal fisheries and other specific restrictions apply to the rigging of fishing gear for bottom trawling.

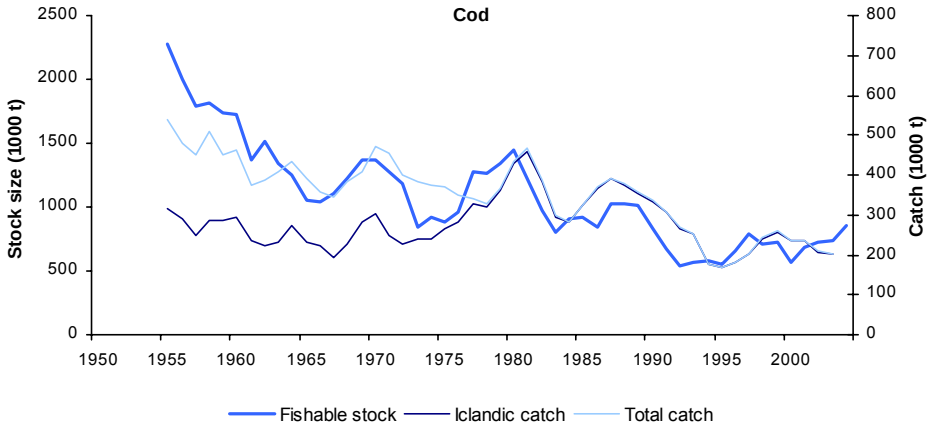
In the current management of the Icelandic trawler fleet, there are no provisions for the limitation of effort use beyond restrictions that are aimed at the protection of fishing areas or temporary closures; i.e. time of fishing and hours used are not limited.

Trawlers are divided into three different categories according to length and fishing capacity (calculated on the basis of engine power and type of propeller). Each category must conform to the general restrictions and category specific restrictions on fishing areas. In addition, temporary closures of fishing grounds are used to protect areas where under-sized fish have been detected, or for other reasons related to fisheries management issues, such as during the spawning season. There are no restrictions on vessel capacity.

3. Status of the cod and other groundfish stocks from 1995 through 2005[8]

The cod stock (figure 6) has been in decline for the last fifty years. Various methods have been used to try to limit fishing effort. With the advent of the ITQ system, quotas were severely reduced as the stock was declining to its lowest recorded levels. This did pay off as the stock started to increase again.

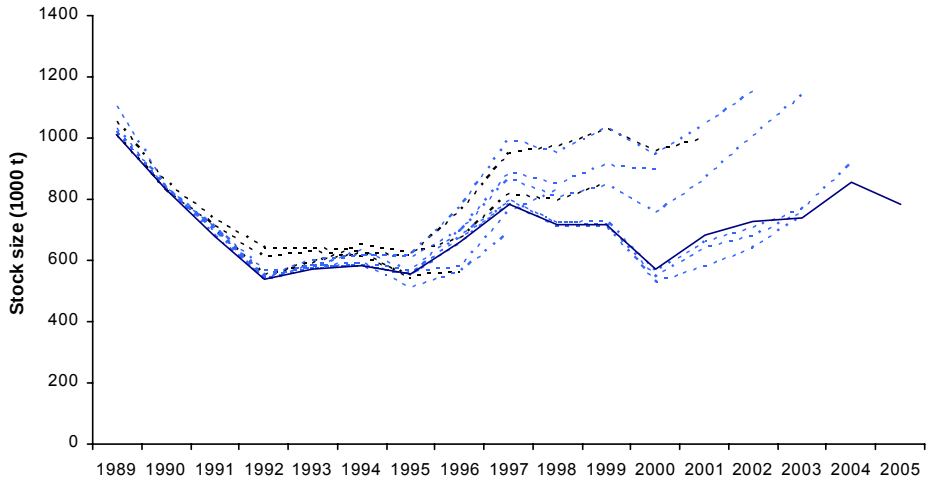
Figure 5. Fishable stock (4+ year old) and catches for Icelandic cod since 1950



The rate of this increase was, however, severely overestimated after 1996 and as a consequence the stock was only granted temporary relief from overexploitation. The TAC was set by a catch rule but, as can be seen in figure 7, this broke down after 1997 as the size of the stock was then overestimated. The seriousness of this overestimate of the stock size was first fully realized in 2000. Hence, although we now know that the real stock size evolved in a Λ-shape from 1995 to 2000 it did not appear like that to fishers or fishery managers at that time but rather as an increase which levelled off in 1997.

[8] This section is co-authored by Hreiðar Þ. Valtýsson

Figure 6. Retrospective pattern of fishable biomass (4+, thous. tonnes) estimates, whole line is current assessment.



Source: Marine Research Institute

The poor status of the cod stock in 1995 was mainly due to high fishing mortality during the prior decades, but generally, poor recruitment from 1985 until 1998 made matters worse. No definite single cause for this low recruitment has been found. Rather cool ocean temperatures could have carried part of the blame, as good year classes are claimed by some (Planque and Frédou 1999) to be more often born in warm years. Other people's studies do not support this, however (Begg and Marteinsdóttir 2002). It is quite possible that low spawning stock size, due to heavy fishing pressure during this period, affected recruitment (Begg and Marteinsdottir 2002, Brander 2000).

From 2000 through 2005 the fishable biomass has increased from around 600 thousand metric tons to about 850 thousand metric tons. This happens when recruitment is relatively low and the spawning stock is stable. Fishing mortality is also down during the period although it is still well above the targeted biomass.

Haddock and saithe, on the other hand, have been increasing rapidly. These increases are thought to be due to improved environmental conditions which have led to lower fishing mortality as effort has not increased linearly with growing stock size. As a result,the haddock stocks can be categorized as improving while other groundfish

stocks in Iceland are overutilized. Table 6 shows the status of the main commercial species with regard to resource utilization. The table shows four categories and average recruitment for cod and haddock during two periods. A stock is underutilized when harvest can be increased without threatening the sustainability of the resource. Fish stocks are fully utilized when the current harvest is close to optimum sustainable yield. The term over-utilized means that current fishing levels must be reduced in order to increase stock abundance and signals that further exploitation, beyond current levels, would threaten sustainability. The fourth category is added because current stock levels of haddock are rapidly improving due to favourable environmental conditions.

Table 6. Classification by status of the main groundfish species

					Recuitment		
	Under utilised	Fully utilised	Over utilised	Overutilised but improving	2001-2003 (Million)	1996-2000 (Million)	Ratio
Cod			x		370	778	48%
Haddock				x	209	110	190%
Saithe		x					
Redfish			x				
Herring		x					
Capelin		x					

Cod is by far the most valuable species. At present it is over-utilized and fishing effort needs to be reduced in order to allow for optimal or full utilization of the cod stock. However, current levels are not believed to threaten the sustainability of the resource since there is less than 1% chance of total stock collapse. The main reasons for slow progress in rebuilding the cod stock are believed to be low recruitment and excessive fishing pressure. Haddock is building up rapidly, as can be seen from increased recruitment during the two periods. The same is true for saithe which has rapidly grown more abundant over the past five years. Hence its current status is at full utilization. Redfish is over-utilized. In fact there are two separate redfish species categorized here as one. Both of them are in a decline due to excessive fishing pressure, including illegal fishing outside of the Icelandic EEZ. Ocean redfish is harvested by Icelandic and foreign vessels and since some of the fishing grounds are outside the 200 nm EEZ it has proven difficult to keep total catch in line with set total allowable catch. Herring and capelin are primarily harvested by specialized purse-seiners or multi-purpose vessels. Only a small proportion is caught by trawlers. Both species are currently fully utilized.

In summary, most demersal fish stocks were at low levels in 1995, some continued to decline until 2000, while others were rather stable. Between 2000 and 2005 there have been rapid increases in some groundfish stocks while the cod stock has been at a lower level than recommended by the MRI. Generally speaking, the Icelandic groundfish fisheries are stable, or somewhat improving. This is evident from the fact that the annual catch of groundfish species has remained relatively stable (see figure 3).

4. Resource rents in the Icelandic fisheries

4.1. On resource rents

Resource rents are defined as profits that exceed normal rate of return after all inputs used in the production process have been paid for, including profits. All costs are defined as opportunity costs. In a properly managed fishery the resource owners/harvesters can earn sustainable resource rent from their harvesting practices. Resource rents are therefore a measure of efficiency in the fishery, where higher resource rents mean a higher level of efficiency.

It is difficult to measure resource rents, especially in a fishery where the fleet is heterogeneous and perhaps harvesting multiple species at the same time. The concept of opportunity costs is also somewhat elusive. What is the opportunity cost of a fisherman that has no other alternative of employment than fishing? Hence, fishermen fishing the same fish stock, from different ports might actually have different opportunity costs. Opportunity costs are difficult to measure except at highly aggregate levels.

The issue of resource rents and resource rent taxation has been strongly debated in Iceland for almost two decades. An excellent overview of the main issues in that debate can be found in a book edited by Helgason and Jonsson (1990) with collection of 25 articles by 12 authors. This book reveals all major arguments for and against resource rent collection and the effect of such taxation. Without giving a detailed description of that debate, once can say that there was one common thread in most of these articles, i.e. that a resource rent taxation will affect the way fishermen harvest their quotas and that the changes will differ between the short run and the long run. In the short run there will be a significant impact on the harvesting and processing sector where labour and capital will share the burden of the resource tax, while in the

long run demand conditions on seafood markets would determine whether the tax would be paid by the consumers or the producers and/or the input factors.

This also conforms with articles by Hannesson (2001) and Arnason (2001) which show that the benefits of a private property right system in fisheries will be shared differently between capital and labour under different conditions within the fishery and in society in general. Overall, society would be better off with a private property right system than with an alternative system of common ownership.

4.2. The size of the resource rent

In this section, the resource rents for the Icelandic trawler fishery are estimated during 2001-2003. The approach is to estimate income share of labour and capital in the fishery and then compare that income share to labour and capital used in other industries. If payments for these input factors are on the average higher than for other industries it is a sign that resource rents exist in the fishery, assuming that that there are no other distortions on the capital or labour markets in Iceland.[9] However, it is not enough merely to look at capital and labour. Government taxation and subsidies, both direct and indirect, affect the factor payments as well. Hence government costs associated with the fishing industry are also examined.

Table 7 below shows the results of factor income analysis for the trawler fishery (wetfish and freezer trawlers combined). The income and cost data come from the annual publication *Profitability in fishing and fish processing* published by Statistics Iceland. Share of capital is calculated as the gross share of capital divided by gross income in the trawler fleet. Gross share of capital is the difference between total income minus labour and all variable costs associated with the fishing activity, but excluding interest payments, taxes and depreciation (also known as EBITA in finance terms). Hence gross share of capital shows how much is left to pay capital expenses (including taxes) after paying for the operating cost of the vessel. The gross share of capital decreases over the period, from 26.4% to 21.8% in 2003. This is mainly due to a stronger currency exchange rate for the krona and increased fuel prices. The share of labour costs is approximately unchanged over the same period. This is as expected, since most of the wages in the trawler fisheries are on a share basis, i.e. the fishermen

[9] The Icelandic economy has gone through some major changes in the past fifteen years. Currently the economy can be described as an open market economy. There are very few limitations on labour or capital markets which allows capital and labour to flow freely between sectors. There is however a ban on foreign ownership in the fishing industry.

get a predetermined share of the total catch value. This share has been calculated officially as 39.8% on the average for the overall fishing fleet. Hence an average number of 39.3% for the trawler fleet in this period seems plausible. During this period, there were no direct payments for user rights or quota holdings. Such payments started in 2004. However, during 2001 – 2003 there were various fees and payments which fishing companies had to pay in order to obtain a fishing license and to be allowed to operate.

Table 7. Factor income analysis for the trawler fleet, 2001 - 2003

	2001	2002	2003
Trawlers			
Share of capital	26%	24%	22%
Share of labour	39%	40%	39%
Total factor return (A)	65%	64%	61%
Opportunity cost (estimated)			
Share of capital	12%	11%	11%
Share of labour	19%	17%	19%
Total return (B)	30%	29%	30%
Resource rent (A - B = C)	**35%**	**36%**	**31%**
In millions of ISK			
Share of capital	4.624	4.800	3.108
Share of labour	**6.172**	**8.364**	**5.926**
Resource rent	10.796	13.165	9.034

The next step is to compare the share of capital and labour to the use of these input factors in other industries in order to find out the difference in factor payments. So the question becomes what is alternative use? Other industries can have abnormal profits, both high and low due to circumstances within that particular industry. Hence, direct comparison of the share of gross capital income is not possible. Statistics Iceland has used a method to calculate imputed cost of capital. This method assumes a user cost of capital of 6% and uses an annuity approach to calculate the present value of current capital costs. Using this method to estimate the opportunity cost of capital (Imputed costs/total revenue) the share of capital is lowered to around 11%. The difference between the EBITA share of capital and imputed share of capital is just below 15 percentage points. This can be seen as the difference in factor payments for capital. This difference is, however, not pure profit to the owner of the vessels, but includes a risk premium for that particular industry as well as capital costs of holding the fishing rights. Hence the true share of resource rent in the factor payment for capital is difficult to obtain without detailed analysis of micro level data.

Factor payments for labour costs are compared to the average of factor payments for labour in all other industries as published by Statistics Iceland. This is believed to be the best estimate of alternate use of labour since it is impossible to guess what fishermen (captains, engineers and deck hands) would do if they stopped fishing. The average payment for one man year in the fishing industry was 106% higher than average payments for all other industries in 2001. This same number was 131% in 2002 and 109% in 2003. Hence it is obvious that factor payments for fishing are considerably higher than factor payments in most other sectors of the economy. This can be due to several reasons. The additional payments for capital may be required to pay for harsh working conditions and added risks in order to be competitive with other industries. Hence, the difference between factor payments for labour in fisheries and other industries is not pure resource rents. Again, the true resource rent cannot be found without looking at micro level data, i.e. looking at individual fishermen in order to see what their alternative would be and how much they need as a risk and working conditions premium. In 2004 and 2005 there was a considerable drop in fishermen's revenues as a result of the strengthening of the Icelandic krona. The drop could be as much as 25% between 2003 and 2005. Fishing companies reported that as soon as wages dropped in the industry it became more difficult to find skilled deckhands and officers. This could be taken as an indication that the premiums need to be high to be able to hire crew members for trawlers.

With these caveats in mind it is possible to estimate the current economic rent in the trawler fishery as around 35% of revenues for 2001 and 2002, decreasing to 31% in 2003. This rent consists both of resource rent as well as risk premiums for capital and labour, as well as intra-marginal rents for the skill level of captain and crew. This comes to a total of between 9 and 11 billion Icelandic kronur annually for the period in question.

5. Distribution of rents

In the previous section it was estimated that economic rents in the Icelandic trawler fishery are positive and up to 10 billion Icelandic kronur annually. The next question is what happens to those rents. This section tries to shed a light on that question.

Resource rents are distributed between capital and labour. Any taxation or fees that are charged for accessing the resource can be seen as resource rent taxation, as long as no other services are provided for that payment. Hence, when looking at the distribution of resource rents, it is necessary to examine payments to and from the government to the industry.

First we look at capital. Table 8 shows the average gross return on capital (EBITDA) for the period from 2001 through 2003. Taxes and various fees are subtracted from this amount as well as the opportunity cost of capital calculated as imputed capital costs. Information on return of capital is based on data from Statistics Iceland while information on corporate taxes and other fees is derived from the Icelandic tax authorities and from the Icelandic Fisheries Directorate.

Table 8. Nett return on capital

Capital	01-'03 average Millions ISK
Return Capital	7,820
Opportunity cost of capital	-3,643
Corporate and other taxes	-752
Nett return on capital	3,425

The calculations in table 8 show that net return on capital is ca. 3.4 billion ISK. This is the share of capital in the economic rent created in the trawler fishery. Corporate taxes are estimated at 750 million kronur for the entire trawler fleet. This is calculated as 18% of the return on capital after subtracting opportunity costs. The opportunity cost of capital represents the cost of capital that is invested in fishing vessels. It takes depreciation into account as well as maintenance. These items, depreciation and maintenance, are not included in the gross return on capital and must therefore be subtracted from gross return before calculating taxes. This is a crude estimate of what the tax would be if the companies did not have any losses from previous years to roll over between accounting years. In fact, the average payment of corporate tax from

2001 through 2003 was around 250 million Icelandic kronur. Accumulated losses in the trawler fleet amounted to 4 billion kronur in 2001 but had been reduced to 1.3 billion kronur by 2003 (www.rsk.is). The losses diminished even further in 2005, down to 600 million kronur. At the same time, corporate tax payments rose from 59 million kronur in 2001 to over 400 million kronur in 2005, or about half of what would have been, if no accumulated losses had occurred. Given the same trend in the future, trawler companies will be paying full income tax before 2012.

The total net return on capital for the trawler fishery in Iceland is estimated as 3.5 billion kronur on an annual basis. This rent is used in various ways including new investments, development and dividends. It can also be used to invest in more harvesting rights and can be seen, furthermore, as a reimbursement for additional economic risk in the fishing industry. It should be noted here that the period from 2001 through 2003 was exceptionally good for the fishing industry owing to external factors, such as stable recruitment in major fish stocks and favourable exchange rates.

Next we turn to the return on labour. Table 9 shows the calculated average gross and net return on labour based on average data for 2001 through 2003.

Table 9. Net return on labour

Capital	01-'03 average Millions ISK
Return Capital	12,687
Opportunity cost of capital	-4,897
Corporate and other taxes	-5,867
Net return on capital	1,923

Labour costs, including wages, labour taxes and other labour related costs, are on average 12.7 billion kronur annually for 2001 – 2003. Subtracting from this an income tax of 4.9 billion kronur (38.5%) and the opportunity cost of labour is estimated at 5.9 billion kronur. In total, the net return on labour is close to 2 billion kronur per year. In comparison to the net return on capital, it is obvious that the government collects a higher share of the resource rent obtained by labour through the income tax. Hence, the government collects a substantial part of the resource rent through the income taxation of fishermen.

There are several deductions from income tax. First there is a general deduction for all taxpayers of ca. 26,000 kronur per month, and there are deductions based on interest payment for own housing. There are also government payments to families with children. In addition, fishermen receive a special deduction of ca. 700 kronur per day as registered fishermen (ca. 21,000 kronur per month). The most relevant deduction for these calculations is the fishermen's deduction since all other deductions are available to other wage earners. This deduction was estimated at just under ISK 600 million (see table 2) for the trawler fishery and should therefore be regarded as a subsidy for labour costs in the Icelandic trawler fishery.

The next table shows average annual government income from trawling activities, as well as government expenditures for the sector.

Table 10. Government income and expenditure from operation of trawlers

Capital	01-'03 average Millions ISK
Resource taxes	0
Corporate taxes	752
Personal income tax	4,897
User fees	437
Management costs	-1,234
Research	-507
Nett return on capital	4,346

The first line indicates resource taxes. During the period in question there was no direct taxation on the holding of harvesting rights. It was not until 2004 that a tax on the holding of harvesting rights was introduced. The average total annual corporate taxes amounted to 750 million kronur (see table 10). Income tax from fisherman amounted to 4.9 billion ISK annually. In 2001 through 2003 fishing companies had to pay various user fees. These fees were a license fee, a monitoring fee and a payment to the Fisheries Development Fund. In total these fees amounted to 883 million ISK in 2001, increasing to 1,100 million ISK in 2002 and 1,140 million ISK in 2003. The Development Fund was the highest item of expenditure, accounting for roughly 65% of the total fee payments. This fee is divided evenly among all quota owners. The inspection and monitoring fees are usually heavier on the larger fishing vessels on account of the nature of the fishing and on board processing. However, since these fees are relatively low, an assumption of even distribution of all fees will be used for these calculations and the inference made that the trawler fleet has the same share of the fees as their share is in total landing value. This results in user fees of 437 million

ISK as an annual average between 2001 and 2003. The total income from the resource to the government is then estimated to be just over 6 billion ISK annually; i.e. income and corporate tax revenues from labor and capital and various user fees. The government provides services to the fishing industry in terms of fish inspection, monitoring and research. This is in the form of the Fisheries Directorate, the Coast Guard, the Marine Research Institute and the Fisheries Laboratories. The FD, CG, MRI and FL are all specialized services for the fishing industry. However, it is difficult to estimate which aspects of the Coast guard provide a service to fisheries and which aspects serve other sectors. At this point no attempt is made to estimate this relationship and it assumed that all Coast guard costs relate to fisheries.[10] Assuming that the trawler fleet receives these services in the same proportion as their share in total landing values, the total cost for the government in providing services to the trawler industry is estimated at just over 2 billion ISK per year. This gives a net income for the government from the trawler fishery of 4.3 billion ISK annually on the average from 2001 – 2003.

In 2004 the monitoring fee and the payment to the Fisheries Development Fund were abolished and replaced by a fishing fee, also known as resource rent tax. This new fee is a payment for owning a quota for one fishing year, whether it is used or not. The amount is similar to the previous user fees and will gradually increase until 2009.

6. Discussion and Conclusions

This report has reviewed the economic performance of the Icelandic trawler fleet from 2001 through 2003 in order to find indications of resource rents in the Icelandic trawler fishery. The findings in the report suggest that there are positive *economic rents* of up to 30% – 35% of total revenue in the trawler fishery, but that it is difficult to estimate the true resource rent in the fishery. One can say, however, that the true resource rent is positive. There are several reasons for this result. Firstly, there has been relative stability in the total catch of the trawler fleet at the same time as the number of trawlers has been reduced. Most of the major fish stocks have either been stable or increasing, with the exception of redfish. This has allowed for more efficient operations of the trawler fleet. Secondly, during the period in question the exchange rate of the ISK was favorable for export companies since the krona depreci-

[10] See Arnason et. Al. (2000) for an overview of fisheries management costs in Iceland, Newfoundland and Norway.

ated with respect to the dollar and the Euro in 2000 through 2002. However, in 2003 the krona started to regain value, and with increases in fuel costs resulted in lower profitability of all fisheries, including the trawler fishery. This shows how vulnerable the seafood industry is to changes in external conditions and that positive resource rent can disappear quickly in the short term if there are changes in the external economic environment of seafood companies.

The trawler fishery has been managed with an individual transferable quota system for more than twenty years now. It took about 10 years for the system to develop from an IQ system to an ITQ system with transferable quotas. It then took another five years until stability was reached in the legal framework with two Supreme Court rulings. Hence, it has only been in the last 5 years that the industry has had the opportunity to fully adjust its strategies to the ITQ system. And it is in the last five years that the most pronounced changes have occurred. The trawler fleet has decreased considerably in terms of number and total Kw from 2000 through 2005. Currently there are only 65 trawlers compared to 110 trawlers at the beginning of the system. It is therefore tempting to conclude that with biological and legal stability,favorable conditions have been created for the consolidation and better utilization of capital resulting in positive resource rents for the trawler fleet.

The factor payments for labor indicate that fishermen get a substantial part of the resource rent. However, as a result of the personal income tax system the fisherman pay a considerable portion of that resource rent in taxes.

The government receives positive income from the trawler fishery after taking into account the share of the fisheries in monitoring, management and research for the fishing industry. This income is estimated at 2 billion ISK annually and is expected to increase in the future, owing to higher corporate tax payments and higher resource rent taxation.

Nevertheless, these calculations should be interpreted with great care. To be able to calculate the true resource rents in a heterogeneous fishery one must use micro level (firm level) data in order to account for risk premiums and intra-marginal rents.

However, in comparison to similar calculations for other fisheries, these calculations give valuable information about the effectiveness of the current fisheries management system and provide indications as to whether the system is able to create a favourable environment for resource rent generation.

Overall it can be concluded that the Icelandic trawler fishery is managed in an efficient manner and that it is capable of realizing a good portion of the potential resource rent, resulting in a positive income stream for the government from the operation of wetfish and freezer trawlers.

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THE NORWEGIAN COASTEL FISHERY WITH 8-14.9 METER VESSELS

av

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Focus on the economy of the Nordic fisheries, **FOI 45**

Forord

I denne casen har vi har valgt å studere ”Sjarkfiske med 8-14,9 m båter i Norge”, siden det har vært arbeidet med kystfiskeriene i andre prosjekter, og dermed allerede var en del data tilgjengelig.

1. Innledning

De norske fiskerier er svært heterogene både med hensyn til fangstteknologi, redskap og fartøytype. Det brukes fartøy fra 6 m til over 70 m, med motorkraft fra under 50 Hk til over 5000 Hk. Historisk sett har næringstilpasningen vært fri – det vil si at så lenge fiskerne hadde forventninger om at en viss båttype og -størrelse kunne gi dem et positivt økonomisk utkomme, og de kunne finansiere prosjektet i private eller offentlige institusjoner, så kunne de som frie næringsutøvere anskaffe en slik båt for fiske. Det var ingen myndigheter som satte begrensninger for fartøy eller kvoter, dog med visse unntak, særlig for tekniske regler knyttet til redskap, område og tidsbegrensninger i fisket. I nyere tid har imidlertid dette endret seg radikalt og de fleste fiskerier er nå underlagt sterke restriksjoner for de enkelte fiskere og redere (mer om dette i neste kapittel). Den frie tilpasningen førte til svært forskjellig tilpasning for fiskerne langs den langstrakte norskekysten (som er flere tusen kilometer lang medregnet fjordene). I samme geografiske område kunne en finne både store og små båter som fisket omlag de samme fiskeslag. For mange fiskere endret også tilpasningen til yrkeslivet seg. Mange kunne arbeide på store havgående båter mens de var unge og spreke men uten særlig kapital, for så å legge seg opp nødvendig egenkapital for kjøp av egen, mindre båt i moden alder. Med rike sesongfiskerier i delvis beskyttede kyststrøk kunne man greie seg godt med et mindre, relativt rimelig fartøy. Det er på denne bakgrunn en må forstå både det store antall fartøy og heterogeniteten i den norske fiskeflåten. I denne rapporten studerer vi særlig økonomien i en av småbåtgruppene, sjarkene i størrelse 8-14,9 m i en periode da de i over ti år hadde vært underlagt adgangsbegrensninger og kvoteordninger for de viktigste fiskeslag. Vi vil takke Fiskeridirektoratet og Norges Råfisklag for god hjelp med data til denne casen, mens Norges Forskningsråd skal ha takk for delfinansiering gjennom prosjektet: ”Sesongvarierende verdiskaping i kommersielle fiskerier – norsk-arktisk torsk.

2. Gjennomgang av eksisterende fiskerier, fiskeriretigheter og reguleringer

Den norske fiskeriforvaltningen har gjennomgått en utvikling fra fritt fiske til et regulert fiske med adgangsbegrensninger. Første lukking av allmenningen kom etter sildekollapsen på slutten av 1960-tallet da den teknologiske utviklingen førte til at sildebestanden nesten ble utryddet. Etter dette ble sildefiskeriet adgangsbegrenset og deltagerne konsesjonspliktige, noe som vil si at eieren har en tidsavgrensa eksklusiv rett til å drive et visst fiskeri så lenge alle vilkår er oppfylte.

Når det gjelder kystflåten er den formelt sett lettere regulert enn den konsesjonspliktige havfiskeflåten. Likevel kom en lukking også av kystfiskerier etter torskekrisen i 1989 da man innså at det trengtes begrensning i både fangst og deltagelse. Videre bakgrunnsinfo er hentet fra Flåten & Hermansen (2005)

Forvaltningen av Barentshavets bestander av torsk og hyse baserer seg i stor grad på bilateralt samarbeid med Russland. Samarbeidet har pågått over lengre tid, særlig på forskningsfronten, og ble i 1975 formalisert i form av en avtale. Som følge av denne avtalen ble Den blandede norsk - russiske Fiskerikommisjon opprettet, og totalkvoten for torsk og hyse som kan fanges nord for 62. breddegrad fastsettes gjennom forhandlinger i dette organet. Kommisjonen baserer sine valg i større eller mindre grad på biologiske anbefalinger fra ACFM (Advisory Committee on Fisheries Management) i ICES (International Council for the Exploration of the Sea).

Kommisjonen fordeler totalkvotene (TAC) for torsk og hyse mellom Norge, Russland og tredjeland. Den norske kvoten for hver art fordeles mellom flåtegrupper og enkeltfartøy gjennom årlige forskrifter. Forskriften utarbeides av Fiskeri- og kystdepartementet på basis av anbefalinger fra Reguleringsrådet, Fiskeridirektoratet, andre organisasjoner og politiske føringer. Fiskeridirektoratet utarbeider først et forslag til regulering som behandles i Reguleringsrådet, hvor både fangst- og foredlingsleddet i næringen er representert. På bakgrunn av denne behandlingen fremmer Fiskeridirektoratet et forslag til regulering til departementet som utferdiger endelige forskrifter.

I tillegg til Fiskeri- og kystdepartementet og Fiskeridirektoratet, har salgslagene i medhold av Råfisklovens §5 myndighet til å innskrenke fisket når hensyn til avtaket tilsier det. I 2002 fastsatte Norges Råfisklag maksimalt dags- og ukekvantum per fartøy under vårtorskefisket i Finnmark, og i perioden 17. februar – 23. mars 2003

gjaldt det maksimale ukekvoter differensiert etter fartøylengde i Troms og Vesterålen. Fra 24. februar samme år gjaldt disse også i Lofoten, Ofoten og Salten.

Adgangen til å delta i fisket etter torsk er begrenset gjennom et sett av regler, hvor anvendelsen avhenger av redskaps-, fartøytype og lengde. Fiske med trål er og har vært begrenset med en konsesjonsordning siden 1951. Alle torsketrålerne har siden 1990 blitt tildelt individuelle fartøykvoter (for en begrenset gruppe siden 1984). Fiske med snurrevad er også konsesjonsbelagt for fartøy lengre enn 28 meter.

Før 1990 var det åpen adgang til å delta i torskefisket for fartøy som benytter såkalte konvensjonelle redskaper (line, garn, juksa, snurrevad). Torskekrisen og god tilgjengelighet for kystflåten hadde ført til at fisket i første periode måtte stoppes allerede 18. april 1989, da kystflåtens gruppekvote var fisket opp. Frem til 1989 var ikke kystflåten regulert med gruppekvote, men fisket på en avsetning av den norske totalkvoten. Denne kunne i følge avtalen med Sovjetunionen overfiskes. Mens man tidligere hadde begrenset fisket gjennom stopperioder, gikk man med den rekordlave kvoten i 1990 over til begrensning både i fangst og deltagelse. Adgangen til å fiske i 1990 avhang av at man hadde levert et minimumskvantum, differensiert etter fartøylengde i ett av de tre siste år. For fartøy som ikke tilfredstilte disse kriteriene ble det åpnet for et svært begrenset fiske på en egen gruppekvote.

Fram til 2002 ble det stilt varierende krav til deltakelse og landet minimumskvantum foregående år for å få delta. I 2002 gikk man over til å kreve at fartøyet hadde hatt adgang til å delta de to foregående årene, og i 2004 bare adgang i 2003. Fartøyene med adgang i det lukkede torskefisket har siden 1996 blitt kalt gruppe I, mens den åpne gruppen kalles gruppe II. Gruppe I tildeles om lag ¾ av den konvensjonelle kvoten, mens Gruppe II tildeles om lag 1/10, og kvotegrunnlaget for hvert fartøy er vesentlig bedre i Gruppe I. Gruppe I deles nå inn i fire lengdegrupper som fisker på respektive gruppekvoter. Resten av den konvensjonelle kvoten går til fartøy over 28 m samt en liten del til bifangst. Fordelingen er vist i tabell 1.

Tabell 1. Fordeling av torskekvoter (tonn) 1999 - 2004						
Fartøygruppe	1999	2000	2001	2002	2003	2004
Norsk kvote	236.500	193.400	195.335	195.335	195.550	217.600
Trål	72.510	57.250	57.878	57.878	57.919	65.693
Konvensjonelle redskaper	163.990	136.150	137.457	137.457	137.516	151.907
Fartøy > 28 m	21.320	17.440	17.608	17.608	17.616	19.459
Gruppe I	127.170	100.810	101.729	104.103	106.836	118.017
Gruppe II	15.500	12.900	15.120	13.746	13.064	14.431
Bifangst	5.000*	5.000	3.000	2.000	0*	0*

* = inkludert i gruppekvotene for Gruppe I og II og for Fartøy > 28 m

Før 1990 var det fritt fiske innenfor gruppekvoten for kystfartøy. I forbindelse med ressurskrisen i 1989 valgte man å innføre individuelle fartøykvoter f.o.m. 1990, differensiert etter lengde for denne gruppen. Etter hvert som kvotene tok seg opp, fikk man i 1994 et system der en del av kvoten var satt av til et konkurransefiske. Dette ble i 1995 rendyrket i form av maksimalkvoter for hvert fartøy. Disse var overregulerte, slik at fisket ville måtte stoppes før alle fartøyene hadde tatt maksimalkvoten. Det ble dermed en sterkere konkurranse mellom fartøyene om den begrensede ressursen. Summen av maksimalkvotene er større enn gruppens kvote, og fisket stoppes når gruppekvoten er oppfisket. Summen av maksimalkvotene dividert med gruppekvoten gir overreguleringsgraden. Dette systemet fungerte godt ved høye kvoter, slik man opplevde frem til 1999, og det var tilnærmet fritt fiske for kystflåten. I 2001 falt kvotene, og fisket ble stoppet allerede 13. mai. Dette året deltok 187 fartøy mellom 8 og 28 m lengde i en ny kvoteordning – samlekvote.

Samlekvoter innebærer at kvoten av torsk, hyse og sei omregnes via faktorer til torskeekvivalenter, og fartøyeieren står fritt til å velge hvordan han vil fordele fangsten mellom disse tre artene. Samlekvoten er i tillegg garantert, det vil si at den fungerer som en fartøykvote. Ordningen ble i 2002 innført for alle fartøy under 15 m i Gruppe I. For de største fartøyene opererer man frem til 2004 med maksimalkvoter for hvert fartøy.

Fordelingen av kvote mellom trålerne og fartøy som fisker med konvensjonelle redskaper har siden 1990 blitt gjort etter en fastsatt fordelingsnøkkel som avhenger av størrelsen på totalkvoten – trålstigen som er vist i tabell 2. Fordelingsnøkkelen er satt slik at en større andel tilfaller de konvensjonelle fartøyene ved lave totalkvoter, og motsatt ved høye kvoter.

Tabell 2. Trålstigen					
Norsk kvote	Under 100' tonn	100-150' tonn	150-200' tonn	200-300' tonn	Over 300' tonn
Konvensjonelle	80%	75%	72%	69%	65%
Trål	20%	25%	28%	31%	35%

Den norske reguleringen av "torskefiskeriene" er noe sammensatt, men i hovedsak er det fangstbegrensninger i form av kvoter som er det sentrale punktet slik forklart i gjennomgangen av fiskerireguleringen her i landet. I tillegg forekommer det diverse direkte reguleringer av fangst og produksjon blant annet gjennom tekniske reguleringer som er detaljregulert i forskrifter i medhold av Saltvannsfiskeloven. Først og fremst opereres det med maskevidde for trål, snurrevad og garn. Dette innebærer at det er påbud på maskevidder, men disse er ikke den samme i alle områder. Reglene er gitt ut i fra biologiske grunnlag, og disse kan sees i sammenheng med minstemålene på arter. Minstemål for fangst av arter er også en slik teknisk regulering som sier at fisken må ha en viss størrelse før den kan fangstes. Noen arter har differensierte minstemål.

Med hjemmel i Saltvannsfiskeloven er det innført flere forbud mot ulike redskaper i diverse fiskerier. Det er blant annet forbudt å bruke flytetrål i fiske etter torsk, hyse og sei innenfor fiskerigrensa og i norsk økonomisk sone nord for den 64. breddegrad. Det er heller ikke lov å fiske etter torsk med not. Bifangstregler er regler som blir fastsatt i de årlige forskrifter om reguleringer i fisket. Disse reglene settes på grunnlag av konsekvensene av at fiske med noen typer redskaper gir innblanding av andre arter enn det primært fiskes etter.

Som nevnt er det forbud mot bruk av trål innenfor fiskerigrensen. I tillegg til denne regelen er det noen områder og soner utenfor fiskerigrensen som blir permanent eller midlertidig stengt for trålfiske, såkalte trålfrie soner. Det finnes en rekke slike soner nord for den 62. breddegrad som av ulike grunner kan bli stengt, f.eks. Jenegga - Malangsgrunn utenfor kysten av Troms som er stengt for trålere i tidsrommet 20. oktober- 20. mars. Hensynet til andre redskaper er viktigste grunn for disse trålfrie sonene, men også andre biologiske hensyn som vern av korallrev, som er av betydning for oppvekst og gyting.

Fleksible områder er en annen type spesialregulering som er behandlet i samme forskrift som trålfrie soner. Dette er områder på fiskefelt opprettet der det kan være stor fare for brukskollisjoner som følge av et intensivt fiskeri. Fleksible områder har

den forskjellen fra trålfrie soner at dette ikke er permanente løsninger, men områder Fiskeridirektøren kan stenge for enkelte fartøygrupper og redskapstyper i hele eller deler av området innenfor gitte tidsrom. Adgangsbegrensninger for spesielle redskapstyper kan dermed innføres i slike fleksible områder.

Stengte områder er reguleringer som skal ta for seg vern av ungfisk. Dette kan være tilfeller med innblanding av fisk under minstemålet eller at innblandingen av andre arter er stor. Fiskeridirektøren kan ved slike tilfeller stenge felter etter at han har anmodet om at flåten frivillig flytter til et annet område. Dette gjelder kanskje i hovedsak fiskefeltene i Barentshavet. Stengte områder har likevel igjen kommet i fokus når det gjelder den truede kysttorskbestanden langs norskekysten. Henningsværbanken og Tysfjorden er eksempler på områder som kan bli stengt for fiske grunnet kysttorsken.

Flere av de viktigste norske fiskeartene har som fellestrekk at hovedtyngden av bestanden migrerer mellom gyte-, oppvekst-, og overvintringsområder. Bestandene er i minst en av disse fasene i kystnære farvann, noe som gir god tilgjengelighet og dermed grunnlag for et effektivt fiske med små fartøy. Den norske fiskeflåten består for en stor del av relativt små kystfartøy. I denne casen bruker vi kun de minste båtene, de såkalte sjarkene. Dette vil være sjarker i størrelsen 8-14,9 m som har drevet "torskefiskerier" i hele landet. I hovedsak fiskes mesteparten utenfor kysten av de tre nordligste fylkene Nordland, Troms og Finnmark, og dette er en flåte som sysselsetter en god del fiskere. Tabell 3 viser hva slags arter dette fisket i hovedsak gjelder med landingsvolumer og verdier, og også hvor mange fartøy og fiskere som deltar. Områdene det fiskes på varierer langs kysten, men man har noen større sesongbaserte fiskerier i spesielle områder. Særlig Lofotfisket og Vårtorskefisket i Finnmark. Redskapstypene som benyttes er garn, juksa, snurrevad, line og reketråling.

Tilgjengeligheten av de viktigste artene for sjarkene er som nevnt sesongbasert som en følge av bestandsmigrasjon. Denne endringen i forhold til tilgjengelighet av fisken i kombinasjon sammen med flåtestrukturen og andre faktorer, er med på å gi et sterkt sesongpreget fiskeri med de fordeler og ulemper det medfører. Sesongfiske har et hovedfortrinn ved at det er kostnadseffektivt, samt at tid frigjøres til alternativ aktivitet. Imidlertid står fiskefartøyene i et gjensidig avhengighetsforhold til alternativ aktivitet, og inntekten deres er nært knyttet til hva industrien kan kreve for produktene i sluttmarkedet, og slik sett ha en stor innvirkning på priser. Fiskeindustrien ønsker kontinuerlige leveranser, noe som ikke harmonerer godt med sesongfiske.

Tabell 3. Nøkkeltall for utvalgte fiskerier.

	2001-2002* (8-12,9 m)	2003-2004** (8-14,9 m)
Antall fiskere (Fulltidsekvivalens - FTE)	**2117,3**	**2416,3**
Antall fiskere (Antall personer per båt x antall båter)	**1535**	**1870**
Fartøy		
Antall	1139	1145
Tonnage BRT (1000)	12,6	15,3
Motorkraft HK (1000)	147,5	181,8
Investeret kapital (Forsikringsverdi Mill NOK)	**1532**	**2523**
Innsats (1000 havdager)	**197**	**196**
Landingsverdi (1000 NOK)		
Torsk	359664	458435
Hyse	69367	57729
Sei	48811	55714
Makrell	24656	20526
Reker	28400	0
Breiflabb	48853	48102
annen fisk	120605	216406
I alt	700357	856912
Landingsmengde (1000 t)		
Torsk	28,3	42,9
Hyse	7,0	9,0
Sei	11,0	15,2
Reker	4,9	4,3
Makrell	1,0	0,0
Breiflabb	1,7	2,1
annen fisk	13,4	23,1
I alt	67,5	96,6
Andel av landets totale landingsverdi (%)		
torsk	12,5	17,9
hyse	11,9	13,4
sei	5,6	6,8
makrell	1,8	1,8
reker	3,3	0
breiflabb	40,8	55,4
I alt	6,2	8,9

Kilde: Fiskeridirektoratet

* Det er blitt benyttet et gjennomsnitt for 2001-2002 (8-12,9 innen "torskefiskerier") og 2003-2004(8-14,9 m, fiske med konvensjonelle redskap) da det er blitt gjort endringer i fartøygruppene det samles inn årlige driftsresultater fra. Disse to gjennomsnittene vil bli benyttet videre i studien når det gjelder driftsresultater.

** For 2003 og 2004 er fartøygruppene 8-9,9 m og 10-14,9 m slått sammen. Dette vil gjelde videre i studien.

3. Vurdering av hvor det i dag eksisterer ressursrente og hvordan denne kan økes

De teoretiske forutsetninger for at det eksisterer en ressursrente er forklart i Hovedrapportens kapittel 1, og kort oppsummert eksisterer det en ressursrente når det oppstår en avkastning utover hva som er normalt for arbeid og kapital i andre næringer. Denne merprofitten skyldes ressursenes knapphet og kalles derfor ressursrente. I adgangsbegrensede fiskerier tilfaller ressursrenten i første omgang de som har rett til å delta i fisket (Flaaten et. al. 1995). En som ønsker å delta i fisket vil være villig til å betale et beløp inntil nåverdien av forventede ressursrente for retten til dette. Det er nærliggende å tro at markedsprisen på fiskekvoter og konsesjoner gjenspeiler ressursrenten i fiskeriet, selv om det kan være forhold som på kort sikt gjør at denne markedsverdien er større enn grunnrenta. Observerte markedsverdier for fiskekvoter kan være høyere enn ressursrenten (Se bl.a. Danielsson 2005). For fartøyene som kjøper rettigheter kan en økt gjeldsgrad være med på å spise opp en del av forventede gevinster.

Bestandssituasjonen er sentral når det gjelder lønnsomheten i fiskeriene. En fiskebestands tilvekst avhenger av rekruttering, vekst, naturlig dødelighet og fiske. Hvordan disse faktorene virker inn er et empirisk spørsmål og vil avhenge av de fiskebestandene vi studerer. Bestandsstørrelsen har en innvirkning på lønnsomheten da en stor bestand vanligvis gir lavere fangstkostnader pr. tonn fisk enn en liten bestand.

Begrepsbruken havforskere benytter for å vurdere fiskebestanders tilstand har variert noe over tid, og mellom institusjoner og regioner. I dette tilfellet bruker vi en ”dynamisk” metode, etter tilrådning fra norske havforskere (pers. med, Harald Gjøsæter, Havforskningsinstituttet). Gjøsæter forklarer at dersom B er mindre enn B_{pa} men større enn B_{lim}, klassifiseres bestanden til "å ha risiko for å ha redusert reproduktiv kapasitet". Dersom B er mindre enn B_{lim}, klassifiseres bestanden til "å ha redusert reproduktiv kapasitet". Dersom F er lavere enn F_{pa}, klassifiseres bestanden til "å være høstet bærekraftig". Dersom F er høyere enn Fpa men lavere enn F_{lim}, klassifiseres bestanden til "å ha risiko for ikke å være høstet bærekraftig". Dersom F er høyere enn F_{lim}, klassifiseres bestanden "å ikke være høstet bærekraftig".

Tabell 4 viser biologiske og økonomiske faktorer som inngår som elementer i om det er høy faktoravlønning. Bestandssituasjonen er vist for torsk, hyse og sei som er de tre viktigste artene i det norske kystfisket[11].

For de tre fiskeartene ser man at torsk har vært ansett for "ikke å være høstet bærekraftig", men har gått over til "å ha en risiko for ikke å være høstet bærekraftig" de siste årene. Hyse er nær "å være høstet bærekraftig", men F-kriteriet medfører at bestanden vil "ha en risiko for ikke å være høstet bærekraftig". Sei er utnyttet godt under F_{pa} og "høstes bærekraftig". Oppsummert kan en si at artene er i relativt god forfatning, men med små muligheter for økning av uttak av torsk og hyse, basert på de biologiske råd som gis. For sei er det imidlertid fortsatt muligheter for et større uttak.

Rekrutteringen av torsk i 2001-2003 har sunket i forhold til 1996-2000, noe som ikke er bra i forhold til forhåpninger om økte kvoteanbefalinger fra ICES. For de to andre artene har vi hatt en sterk økning som vist i tabell 4. Imidlertid er det torsk som er den viktigste og best betalte arten, og en økning i rekruttering ville være ønskelig med tanke på at torsken er en bestand som fra biologisk hold regnes som fullt utnyttet. Det ligger likevel et potensial i en større utnyttelse av sei, og muligens også for hyse hvis en god rekruttering vedvarer.

Pris er en viktig faktor for lønnsomheten i kystfisket. Vi ser i tabell 4 at prisen har gått opp for torsk og hyse i 2001-03 sammenlignet med 1996-2000. Seien har ligget ganske stabil på litt over 4 kr kiloet. For gjennomsnittspris må det tas forbehold om at det er noen brudd i statistikken fra Fiskeridirektoratet med tanke på pris innenfor de ulike fartøygrupper. Gruppene har endret seg mellom 1996 og 2004 og vi har derfor tilpasset fartøygruppene og vektet prisene best mulig. For framtiden kan pris få stor innvirkning på ressursrenten da de viktigste fiskebestandene i våre farvann regnes som fullt utnyttet, noe vi kan lese ut fra tabell 4 (se også Hannesson 2005). Prisen vil kunne øke som følge av en voksende befolkning og et høyere inntektsnivå. På bakgrunn av at verdensfangsten av villfanget fisk har stagnert eller gått ned, og neppe kan forventes å øke, kan også prisstigning bli en konsekvens av dette (FAO 2004). Etterspørsel er likevel et komplekst spørsmål. Selv om som befolkningen vokser og etterspørselen øker, vil den kunne modifiseres ved at konsumentene kan endre sitt syn på mat og slik vil kunne endre sine konsummønstre (FAO 2004).

[11] Her gjelder det Nordøstarktisk torsk, Nordøstarktisk hyse og Nordøstarktisk sei (også benevnt som sei nord for 62° N)

Tabell 4. Faktorer som inngår som elementer i om det er høy faktoravlønning.

	2001	2002	2003
Biologiske faktorer:			
Torsk			
Blim (tonn)	220000	220000	220000
Bpa (tonn)	460000	460000	460000
Gytemasse/SSB (tonn)	333704	537737	642613
Flim	0,7	0,7	0,7
Fpa	0,42	0,42	0,42
F	0,7473	0,6719	0,4595
Hyse			
Blim (tonn)	50000	50000	50000
Bpa (tonn)	80000	80000	80000
Gytemasse/SSB (tonn)	92814	87103	125791
Flim	0,49	0,49	0,49
Fpa	0,35	0,35	0,35
F	0,35	0,4292	0,3635
Sei			
Blim	89000	89000	89000
Bpa	150000	150000	150000
Gytemasse/SSB (tonn)	536915	532946	447940
Flim	0,45	0,45	0,45
Fpa	0,26	0,26	0,26
F	0,1627	0,2136	0,1842
Rekruttering (Individer)*	1996-2000	2001-2003	Endring (%)
Torsk	658515	533473	-19
Hyse	96364	246744	256
Sei	197446	301604	152
Økonomiske faktorer:			
Pris (NOK)	1996-2000	2001-2003	Endring (%)
Torsk	7,70	11,70	51
Hyse	5,90	8,80	50
Sei	4,20	4,10	-1

Kilde: Fiskeridirektoratet og ICES
* Tall hentet fra ICES viser rekruttering ved årgang 3 for torsk og hyse, og årgang 2 for sei. Det antas her at fiske da kan startes på disse bestandene.

Historisk sett har Norge hatt en differensiert flåtestruktur og stor geografisk spredning av fartøyene. I nyere tid har man søkt å opprettholde disse karakteristika i arbeidet med å få en mindre fiskeflåte som er bedre tilpasset ressursgrunnlaget. Dette for å sikre lønnsomhet for den enkelte driftsenhet, og for å bevare ressursene i et langsiktig perspektiv. Virkemidler for å opprettholde dette er at fiskeflåten er pålagt ulike begrensninger og føringer gjennom reguleringer. Dette er forhold som påvirker ressursrenten. En betydelig del av den potensielle ressursrenten er kapitalisert i form av overkapasitet – antall fartøy går ned mens kapasiteten reelt sett øker. Tall fra SINTEF viser at det i årene fra 1990-2000 har vært en reduksjon i antall fartøy med

24 %, mens totalkapasiteten i samme periode har økt med 30 % (Standal & Aarseth 2002).

Hvordan ressursrenten realiseres må også ses i sammenheng med det internasjonale samarbeidet for forvaltning av fiskeressursene, historiske føringer for fordelingen av ressursene nasjonalt, og politiske hensyn som ligger til grunn for fiskeripolitikken. I Norge vil det definitivt være distriktspolitiske utfordringer i flåteleddet med tanke på kapasitetstilpasning og hvilke kystsamfunn som fortsatt vil kunne bestå. Problemstillinger rundt hvorvidt lønnsomheten i fiskeriet skal måles bedriftsøkonomisk eller samfunnsøkonomisk er andre sentrale utfordringer for fiskeriadministrasjonen.

I norske fiskerier har vi årlige lønnsomhetsundersøkelser av fiskefartøy som gjøres av Fiskeridirektoratet og Budsjettnemnda for fiskerinæringen. Dette gir oss driftsresultater for de ulike fartøygruppene, inklusive de som er med i vår case, og man kan finne avlønning av kapital og arbeidskraft gjennom disse data. Avlønning av arbeidskraft i alternativ anvendelse tar utgangspunkt i tall fra Statistisk Sentralbyrå med årlige tall fra nærings og nytelsesmiddelindustri, da man antar at det i de fleste av samfunnene med kystbasert fiskeri ofte ikke har annen alternativ industri å tilby. I tabell 5 ser vi faktisk avlønning av produksjonsfaktorene i fiskeriet sammenlignet med avlønning i alternativ anvendelse basert på ovenfor nevnte data.

Tabell 5. Faktisk avlønning av produksjonsfaktorene i fiskeriet sammenlignet med avlønning i alternativ anvendelse, i prosent av landingsverdien pr fartøy.

	2001-2002 (8-12,9 m)	2003-2004 (8-14,9m)
Avlønning av kapital	7,8	4,5
Avlønning av arbeidskraft	56,2	54,2
Avlønning av ressursen*		0,2
Total (A)	64,0	59,0
Avlønning av kapital i alternativ anvendelse	4,6	6,1
Avlønning av arbeidskraft i alternativ anvendelse**	**57,3**	**62,7**
Total (B)	62,0	68,8
Nåværende ressursrente (C=A-B)	2,0	-9,9

Kilde: Fiskerdirektoratet, Statistisk sentralbyrå (Lønnsstatistikk for industriarbeidere).
* Strukturavgift på fangst. Les mer om denne i kapittel 4.
** Lønn i nærings- og nytelsesmiddelindustrien, hentet fra lønnstatistikk fra Statistisk sentralbyrå.

Det er en lav positiv ressursrente for 2001-02 (8-12,9 m), mens ressursrenten er negativ i de to neste årene der man har utvidet lengden i fartøygruppen med to meter (8-14,9 m). Denne negative renta kan være en konsekvens av at de alternative arbeidsplassene som er tilgjengelige i mange av fiskeribygdene langs kysten ikke gjennom lønn alene kan friste for alternativt arbeide. Kanskje er en mulig forklaring at det er noe med spenningen av å være ute på fiske framfor å jobbe innen fiskeindustrien. Ellers kan det også være fiskere som prioriterer verdier som nærhet til familie i stedet for deltagelse i det økonomisk mest gunstige fiskeri, eller verdsetter fritid høyt. Dette er verdier som ikke reflekteres i fartøyenes regnskaper, men som like fullt kan være avgjørende for enkelte fartøys fisketilpasning, og da kanskje spesielt for mindre fartøy som er med i denne studien.

Det er muligheter for en økning av ressursrenten i de norske kystfiskeriene. Som vist i Standal & Aarseth (2002) utvikles det kontinuerlig tekologiske nyvinninger som effektiviserer fangsten. Overkapasitet medfører mange negative konsekvenser som press på ressursene, press på reguleringsordningene, at mer omfattende kontroll- og håndhevingsordninger trengs, og at kvotene pr fartøy blir mindre enn de kunne vært. Dette er blant annet noe av grunnene til at man ser det på som en gevinst å etablere gode strukturvirkemidler for flåten. I 2003 ble det innført en strukturkvoteordning for kystfartøy over 15 m, men interessant for vår case er at det har blitt etablert et strukturfond for kondemnering av fartøy under 15 meter fra og med 1. juli 2003. Innføringen av strukturkvoter i de ulike fiskerier er ment for å skulle være et virkemiddel for å realisere et høyere overskudd i fiskeflåten (mer om strukturfondet i neste kapittel). I øyeblikket er det en pause i strukturpolitikken da et utvalg oppnevnt av sittende regjering skal utrede strukturspørsmålet innen 15.august 2006.

Som vist er det ”torskefiskerier” som er viktigst for kystflåten. Imidlertid har det kommet et nytt bidrag til kystflåten i Finmark gjennom introduksjonen av kongekrabbe til det østlige Barentshavet av russerne for rundt 40 år siden, med videre spredning til den norske økonomiske sonen. Fra 2002 ble det innført et kommersielt fiske på arten. Landinger av kongekrabbe kommer inn under ”annen fisk” i tabell 3. I utgangspunktet var dette fisket ment for de fiskefartøyene som hadde kostnader på redskap og andre ulemper i forhold til den fremmede arten, men i de senere år har også andre båter fått tildelt kvoter, og omsetning av kvoter foregår også i praksis. Kongekrabben er en godt betalt ressurs i markedet og har slik for mange vært et kjærkomment innslag. Wessel (2004) har gjort en lønnsomhetsanalyse av fisket på kongekrabbe for å undersøke om båtene som fisker etter kongekrabbe har en signifikant større lønnsomhet enn båter som driver med vanlige torskefiskerier.

Wessel sine resultater viste at båtene mellom 8-12,9 meter som fisket kongekrabbe hadde en signifikant høyere profitabilitet enn båter av samme størrelse som ikke hadde slik kvote. For båter over 13 meter kunne man ikke finne en slik signifikant forskjell. Dette viser at kanskje burde en større del av de små sjarkene fisket på kongekrabbekvoten for slik å gi en optimal utnyttelse av ressursen. I de siste par år har kvotene på kongekrabbe stagnert og ligger nå på 300 000 dyr, dette samtidig med at antall fartøy har økt, prisene gått ned, og russerne har fått økte kvoter. Dette er faktorer som er med på å gi dårligere lønnsomhet i dette fisket.

Når det gjelder samfunnsøkonomiske effekter av kongekrabben, er disse både positive og negative. Eriksen (2005) presenterer en bioøkonomisk analyse av kongekrabbens predasjonskostnader, men resultatene fra denne analysen viser at kongekrabben har en liten indirekte negativ økonomisk effekt med sine beitevaner ut fra den begrensede økologiske kunnskapen vi sitter med i dag. Andre innfallsvinkler for senere analyser vil kunne være nyttig i forvaltningssammenheng da arten er et hett miljøpolitisk tema.

Når det gjelder torskefiskeriene ligger noe av utfordringene rundt økning av lønnsomhet i det faktum at dette er i hovedsak sesongbaserte fiskerier. Flåten & Hermansen (2005) har gjort en studie på sesongsvingningene og kappfiskeproblematikken det i mange tilfeller har resultert i. Landingsmønsteret av torskefangster fra kystfartøy er et resultat av en rekke faktorer. Her er fiskens tilgjengelighet, kvalitet, pris, flåtestruktur, reguleringsregimer og lønnsomhet i alternative fiskeri eksempler. Ifølge Flåten & Hermansen (2005) er det i fylkene Troms og Nordland enda sterkere krefter som opprettholder et sesongfiske enn i Finmark der man oppnår de beste prisene i forkant av sesongen. I Troms og Nordland er det en fallende pris etter sesongen som antageligvis er en kombinasjon av lavere gjennomsnittsstørrelse og sannsynligvis sterkere fall i etterspørselen enn tilbud med en påfølgende dreining i forhandlingsmakten med kjøperne. Det argumenteres med at det ikke er benyttet tilstrekkelig med virkemidler for å oppnå et mindre intenst fiske etter torsk og samtidig gi industrien på land bedre muligheter til å tilby ferske produkter året rundt. Noen forslag til tiltak som nevnes er: priskompensasjon for mindre effektiv fangst, endret kvoteår, overføring av kvoter mellom år og periodisering av kvoteåret.

I tillegg har man andre problemer knyttet til bifangst og utkastproblematikk som kan ha en innvirkning på bestandssituasjonen for en del arter. Utkast kan komme av at man såkalt ”high grader” fisken og kaster ut den mindre dårligere betalte fisken for å få større fisk som får bedre priser. Andreasson & Flåten (1996) viser at det er et stort

potensial for å generere ressursrente ved begrenset fiskeadgang og høsting, og ved riktig valg av selektivitetsmønster. Allerede så tidlig som i 1991 ble det blant annet slått fast i en rapport om torskefiskets økonomi og regulering at i et bioøkonomisk optimalt fiske vil kystfiske med stormaskede garn gi størst økonomisk overskudd i form av ressursrente, og at fiskepriser og fangstkostnader er av betydning for den potensielle ressursrente i torskefisket (Armstrong et al 1991). Det viktigste er likevel redskapenes seleksjonsmønster. Dess skarpere seleksjon rundt 8-10 år gammel fisk, jo bedre samfunnsøkonomi vil dette gi (ibid).

Det har vært gjort få beregninger av den totale ressursrenten i norske fiskerier. Ifølge Hersoug (2003) er det gjort beregninger på ressursrenten til de norske fiskeriet kalkulert til omlag 2 milliarder per 1989. Dette har i de senere år blitt justert til 4-5 milliarder kroner. I en flerbestandsanalyse i Flaaten (1988) er grunnrenten beregnet for de totale torske- og sildefiskerier i Barentshav-Norskehav området, ved bruk av norske fartøykostnader og fiskepriser. Med 45 % av fangstene til Norge ville grunnrenten i 2004 priser tilsvare hele 6,5 milliard NOK. Dette betinger imidlertid en kraftig høsting av sel og kval for å frigjøre mer fisk for fiskerne i torske- og silde/loddefiskeriene. Som kjent er sjøpattedyrene store konsumenter av fisk (se for eksempel Blix et al, 1995). Nylig har Steinshamn (2005) har gjort en studie av ressursrenten i norske fiskerier som et ledd i en utredning for Fiskeri- og kystdepartementet. Ved bruk av en lineær programmeringsmodell er ressursrenten beregnet for ulike fartøygrupper. I den konvensjonelle fartøygruppa mellom 8-12,9 m kan ressursrenten økes fra å være å være minus 70 millioner kr til å bli på maksimalt 770 million NOK, avhengig av bl.a. diskonteringsrenten. Den totale ressursrenten for alle de norske fiskerier ved 5 % avkastning er ifølge Steinshamn (2005) på rundt hele 7,4 milliard NOK når avskrivning av fartøyene det ikke regnes med.

På sikt kan en beskatning av ressursrente innføres og slik føre til at denne avkastningen fra fiskeressursene også gir en del til samfunnet, og kan være med på og stadfeste fellesskapets eierskap til ressurssene. Ressursrentespørsmålet vil videre utredes fra norske myndigheters hold. Som tidligere nevnt har det etter regjeringsskiftet i 2005 blitt oppnevnt et strukturutvalg med representanter fra ulike interesser i fiskerinæringa som skal utrede effektene av strukturtiltakene i fiskeflåten, og fremme forslag til Fiskeri- og kystdepartementet på hvordan strukturpolitikken bør utformes innen 15.august 2006. Det hersker uenighet rundt endringene i fiskeripolitikken da mange mener den har ført til en privatisering av fiskeriressursene med blant annet evigvarende fiskerettigheter. Det finnes også politiske utfordringer i

forhold til rekruttering av unge fiskere, og det ugunstige landingsmønsteret til fiskeriene for en kontinuerlig industriproduksjon på land.

Reguleringssystemet i Norge vil stadig være i endring med ulike direkte og indirekte virkemidler mot produksjonsfaktorene og fangsten for å maksimere netto overskudd fra næringen. Kapasitetstilpasning er på mange måter et politisk spørsmål, og fra de ulike fagretninger og interesser vil forskjellige virkemidler og synspunkter presenteres for beslutningstagere. For det oppnevnte strukturutvalget nevnt ovenfor er slike problemstillinger svært aktuelle.

4. Vurdering av hvordan den totale faktoravlønning i fiskeriet i dag er fordelt mellom erverv og samfunn

For de norske kystfiskerier eksisterer det ingen direkte beskatning av ressursrenten. Det eksisterer derimot en form for indirekte ressursbeskatning gjennom en liten strukturavgift innført i juni 2003. Denne strukturavgiften skal finansiere et strukturfond styrt av Innovasjon Norge. Dette er et strukturfondet for kapasitetstilpasning av fiskeflåten for å kunne sikre stabil tilgang på midler til kondemnering av fiskefartøy under 15 m, og dermed legge til rette for den nødvendige strukturering i ulike fartøygrupper (Fiskeridirektøren 2004).

I tabell 5 i forrige kapittel ser vi strukturavgiften tatt med under ”avlønning av ressursen”. Strukturavgiften betales som en avgift av brutto fangstverdi for all fangst som til enhver tid er omfattet av salgslagenes enerett til førstehåndsomsetning etter Råfiskloven. Denne avgiftsplikten gjelder også når fangst leveres i utlandet og når fisker selv overtar fangsten

Når det gjelder indirekte ressursbeskatning via det generelle skatte- og avgiftssystemer, gjelder dette som i andre næringer. Dette vil da være i form av overskuddsskatt til selskaper, alminnelig skatt på lønn og kapitalskatt. I fiskeri har man et spesielt fiskerfradrag som er ment som en kompensasjon til fiskere for ugunstige arbeidstimer med fravær på havet og lignende. Dette fradraget bør dermed ikke ses på som en subsidie. Fradraget vil gis med inntil 30 % av netto arbeidsinntekt fra fangst eller fiske og er begrenset til 80,000 NOK.

Omsetting av fiskerettigheter forekommer i Norge, men dette har man ikke noen offisielle tall på siden det er en indirekte omsetning gjennom kjøp og salg av fiskefartøy.

Det er vist en skarp nedgang i subsidier til det norske fiskeriet i perioden 1990-2002 (Hermansen & Flåten 2004), så subsidiene til norske fiskerier per i dag tilnærmet lik null. Dette gjelder også for sjarkflåten. Man har imidlertid som forklart gjennom strukturfondet en kondemneringsordning for å kunne sikre midler til kondemnering av sjarker. Som nevnt inngår strukturfondet i de siste års strukturpolitikk som et virkemiddel for å redusere kapasiteten i fiskeflåten. I utgangspunktet skulle strukturfondet finansieres i hovedsak fra fiskeflåten selv, men det var likevel et krav fra fiskerne om at staten skulle bidra. Staten mente at de skulle bidra minst mulig, men i tabell 6 ser vi tilskudd på noen millioner fra staten årene 2002-2004. I 2003-2004 ble det totalt gjort utbetalinger for 102,8 millioner i 201 kondemneringssaker (Pers med, Aase M. Remøy, Innovasjon Norge). Flere båteiere enn de 201 sakene registrert har søkt om tilskudd, men har grunnet misnøye med tilbudet de har fått ikke gjennomført kondemnering.

Det er ulike oppfatninger om at det å unnlate å belaste næringen for kostnadene for fiskeriforvaltningen er en form for skjult subsidiering, og dette er et spørsmål som har fått økt oppmerksomhet i internasjonale fora de siste årene (Shrank et. al 2003). Dette vil ikke være ressursrentebeskatning i egentlig forstand, men en skattelegging av ressursrente er en av flere måter å belaste næringen for fiskeriforvaltningens kostnader.

I tabell 6 ser vi statlige overføringer til norsk fiskerinæring, og da i hovedsak til den norske fiskeriforvaltningen, men også blant annet til nevnte kondemneringstilskudd.

Tabell 6. Statlige overføringer 2002-2004.			
Mill NOK	**2002**	**2003**	**2004***
Direkte utbetalinger			
Kondemneringstilskudd	11,7	21,5	31,4
Inntektsgaranti	8,1	9,9	11
Totalt	19,8	31,4	42,4
Kostnadsreduserende overføringer			
Reduksjon av transportkostnader	26,4	42,2	25
Annen kostnadsreduserende støtte	36,6	46,7	22,6
Andre støtteordinger og subsider	0,6	0,3	
Totalt	63,6	89,2	47,6
Generelle forvaltningskostnader			
Fiskeri- og kystdepartementet	29,8	31,4	30,1
Medlemskap i int. organisasjoner	6,1	6,1	6,6
Havforskningsinstituttet (IMR)	145,9	157,7	164,2
Drift av forskningsfartøy	174,8	101,4	95,2
Fiskeridirektoratet	129,4	132,6	100,8
Kystvakten	386,5	389,5	415,8
Nye forskningsfartøy	284,5	67,5	
Totalt	1157	886,2	812,7
Totalt alt	1240,4	1006,8	902,7

*Data are balanced budget figures
Kilde: OECD

I Norge har vi en eksportavgift på eksport av fiskeprodukter. Eksportavgiften gjelder for eksportører av fisk og skal finansiere EFF (Eksportutvalget for fisk) som driver generisk markedsføring av norsk fisk samt informasjonsarbeid. Denne avgiften blir ikke nærmere diskutert.

I tabell 7 ser vi fordelingen av den nåværende ressursrenten i fiskeriet. Vi observerer at for totalen i 2001-2002 ligger den største delen i nettoavlønning av arbeidskraft, mens den er lavest som gevinst til offentlige myndigheter. Dette viser at her kommer samfunnet dårligst ut og ervervet best ut for den lille totalen man har. For årene 2003-2004 har vi en negativ ressursrente jevnt fordelt. Strukturavgiften er inkludert i "gevinst til offentlige myndigheter" for 2003-04.

Tabell 7. Fordeling av den nåværende ressursrente i fiskeriet (avlønning av produksjonsfaktorene utover avlønning i alternativ anvendelse), i prosent av landingsverdien pr fartøy.

	2001-2002 (8-9,9 m)	2003-2004 (10-14,9 m)
Nettoavlønning av kapital	0,96	-2,9
Nettoavlønning av arbeidskraft*	1,16	-3,5
Gevinst til offentlige myndigheter	**-0,13**	**-3,5**
Total**	2,0	-9,9

Kilde: Fiskeridirektoratet, Statistisk Sentralbyrå(Industrilønn) og Skatteetaten.
* Skatten er hentet fra Skattetaten og er skatt på alminnelig inntekt klasse 1 (?). I Norge får fiskere et såkalt fiskerfradrag. Vi har valgt å se bort fra fradraget i denne fordelingstabellen da fradraget ikke bør regnes som en subsidie siden det er en kompensasjon for fravær fra hjemmet og lignende.
** Denne totalen svarer til C, den nåværende ressursrente, i tabell 5.

5. Avslutning

I denne rapporten viser vi at det i gjennomsnitt ikke er grunnrente i den norske sjarkflåten, men også at inntektene for fiskerne som eier disse båtene er om lag det samme som i alternative næringer. Det kan være dette som gjør at denne båtstørrelsen er attraktiv for mange fiskere, særlig i utkantstrøkene. Anekdotiske rapporter tyder på at fiskerettighetene for slike fartøy i torskesektoren omsettes for opptil 2 million NOK (pluss fartøyverdien). Dette er et tegn på at mange fiskere bruker lavere alternativ verdi på sin arbeidskraft og kapital enn det som er nyttet i dette prosjektet, eller at de rett og slett overvurderer de framtidige inntektsmuligheter. I sistnevnte tilfelle vil dette avspeiles i framtidige lønnsomhetsundersøkelser ved økende finanskostnader som går til avbetaling og renter på lånene fiskerne har tatt opp til kjøp av båt og kvoter. For framtidige økonomiske analyser blir det derfor viktigere å kunne skille mellom driftskostnader for selve fartøyet og dets fiskeri og finanskostnadene knyttet til fiskerettighetene. Sistnevnte type er en kostnad for det enkelte fartøy, men sett fra samfunnets side kan dette avspeile hele eller deler av den kapitaliserte grunnrente. Den usynlige grunnrente kan være skjult i fartøyenes regnskap, men fra et samfunnsøkonomisk synspunkt er det viktig å kunne skille den ut.

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Appendiks

Inntekts og kostnadsdata, total for sjarkfiske (2001-2002: 8-12,9m; 2003-2004: 8-14,9m)		
Mill NOK	**Gjennomsnitt 2001-2002**	**Gjennomsnitt 2003-2004**
Landingsverdi	717,6	869
Drivstoff	34,1	41,8
Andre variable kostnader	62,8	91,7
Fartøykostnader	135,6	165,4
Arbeidsgodtgjørelse til mannskap	403	463,6
Driftsresultat	82,1	106,5
Avskrivning fartøy	33,3	62,2
Finanskostnader	55,8	39,3
Ordinært resultat før skatt	-7	4,9

Kilder: Fiskeridirektoratet og Statistisk sentralbyrå

THE FAROESE PAIR TRAWLER FISHERY

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1. Introduction

The purpose of this paper is to study the economic performance of Faroese pair trawlers larger than 400 horse powers (hp). The focus is on the economic return of society, measured by the resource rent. The resource rent is defined as "*the return which is left to the remuneration of capital and labour above the level in other businesses*". The resource rent is calculated *before* and *after* the deduction of net public expenses to the fishery such as subsidies and fisheries management costs. The size of the resource rent is identified, and it is assessed whether and, if affirmative, how it potentially can be increased. Our main focus is on the present effort-management system limiting the vessels' number of days at sea. Furthermore, the present allocation of the resource rent between capital, labour and the public authorities is identified. Furthermore, it is assessed how and within which limitations the public authorities can increase their share of the resource rent. Calculations are performed on the basis of detailed statistics.

In the Faroe Islands, the issue regarding the size of the resource rent is currently of an important nature, since effort regulation was introduced during the fishing year 1996-97, and as no analysis has been performed on the economic efficiency of their management system since then. Such an assessment is carried out in the present paper, in which the size of the resource rent generated by Faroese pair trawlers is identified and an analysis of why the management system works as it does, is made.

The allocation of resource rent is interesting, since society, according to the Fishery Law, owns fish resources without necessarily obtaining a significant share of the resource rent. Hence, there might be a potential for increasing the public share of the resource rent from the 2001-2003 level, in which period biological factors affected the catch potential in a positive way. In the present paper, it is also identified how the general tax system and net public expenses affected the allocation of resource rent. Opportunities and limitations for re-allocation from capital and labour to the public sector are analyzed as well.

Section 2 provides a summary of the Faroese pair trawler fishery including common and specific regulations. Section 3 identifies the size of the resource rent in the Faroese pair trawler fishery, and argues how it can be expanded to reap greater benefits in the future. An assessment of the potential increase in the resource rent through changing fisheries management is also provided. Section 4 identifies the allocation of the resource rent between capital, labour and the public sector *after* the deduction of

net public expenses to the fishery. An assessment of the resource rent re-allocation from capital and labour to the public authorities is also provided. This can be done in several ways, e.g. by phasing out subsidies to the fisheries sector, by collecting fees on fisheries management costs or by introducing a tax on landings. Concluding remarks are provided in Section 5.

It should be pointed out that the results obtained are based on various assumptions. Therefore, the results are subject to uncertainty and should by implication be interpreted cautiously.

2. The Faroese Pair Trawler Fishery

The Faroe Islands are located along sea lanes between the Norwegian Sea and the North Atlantic Ocean. The surrounding water masses are dominated by the North Atlantic drift, providing temperate water all year round and a robust biological environment. The Faroese Home Rule Government (FHRG) is responsible for fisheries policy and management. Faroese fishing takes place in the immediate area of the islands, in middle areas and in distant waters. The introduction of the 200 nautical mile Faroese Exclusive Economic Zone (EEZ), which was erected in 1978, changed the pattern from dependency primarily on the middle areas to a relative greater dependency on the national fishing territory and areas of close proximity. Approximately a third of the working population (6,000) is employed in activities related to fisheries. Of these 6,000, over one third is employed in the capture sector (2,600), while a quarter is employed in processing (2,500). The Faroe Islands have a near mono-economy as regards exports, and limited alternative foreign income earnings potential. This dependency makes the society vulnerable to any fluctuations in catch and landings, due to either natural conditions or improper management. An efficient management regime is consequently required to achieve stable economic conditions.

In the late 1980s and early 1990s, The Faroese Islands experienced a deep economic crisis that caused a significant deficit on the Home Rule Government's budget, and a series of difficulties for the main commercial banks in meeting their solvency standards. As the Faroese economy is dependent on fisheries, the crisis deepened due to a significant fisheries reduction in the main demersal fish stocks, which reached historically low levels in early 1990s. Consequently, there was a recognized need to develop an efficient regulation of the fisheries, which had until then been heavily subsidized and only regulated by technical measures like closed areas and mesh size regulation.

The Home Rule Government, in agreement with the Danish Government, established a Commission with the task of exploring regulation approaches to allow optimal and sustainable resource exploitation in such a way that the fleet economy could be sustained on regular market terms. The Commission report (Anon. 1993) recommended a Total Allowable Catch (TAC)-based Individual Transferable Quota (ITQ) regulation system covering all vessels above 20 Gross Tonnes (GTs); whereas the artisan fisheries were to be regulated through a separate catch ceiling.

The resulting regulation introduced in 1995, was met with resistance from the industry and part of the political system, since it resulted in significant discarding and the landing of "black fish". As a response to the resistance against the ITQ system, a new Commission was established with the purpose of evaluating alternative regulatory measures that could mitigate the problems. The new Commission report (Anon. 1996) recommended the introduction of fleet-based effort regulation, supplemented with a restrictive system of fleet-based area closures. The recommendations were codified in a new fishing law introduced for the fishing year 1996-97 (Anon. 2003). At that time, the Faroese fleet was reduced significantly due to the economic crisis.

Anon. (1996) discusses and compares the recommended effort regulation in relation to the ITQ regime. In particular, it is noted that an effort regulation has the following impact on the fishery:

- It removes incentives for discarding and black landings;
- It may lead to more reliable catch information for stock assessment;
- It is more robust than a TAC system, it is less dependent on the recent and possible uncertain stock estimates; and
- It would gain a wider acceptance from the industry.

However, several weaknesses of the effort regime were also identified, including problems of increasing efficiency due to technological developments. Preliminary work carried out by Løkkegaard *et al.* (2004) on Faroese effort regulation points out that catch rates may be expected to increase over time based on technological development of the Faroese regulation. Calculations of changes in catch rates are complicated technically, and quantities of allocated days at sea do not take into account this effect of the Faroese regulation.

The existent Faroese effort regulations are implemented through the use of individual and transferable days at sea. This effort regulation is applied only to the fisheries within EEZ targeting demersal species such as cod, haddock and saithe.

The six corner stones in the present Faroese fisheries management are the following:

- ***Fleet Segmentation***. Different regulations apply to various fleet segments but the same regulation applies to all vessels within a segment. The main fleet segments are: (i) pair trawlers, (ii) long-liners, (iii) medium-sized vessels (i.e.15-110 GT) classified by size and gears, and (iv) artisan vessels that only include jugs and long lines divided between full-time and part-time fishermen.

- ***Capacity Regulation.*** Aims decreasing capacity within each fleet segment at the 1997 level. Capacity is regulated through a licencing system. Rules are made to allow the renewal of vessels (i.e. restricting vessel size changes) and merging of capacity. Subsidies have earlier been used in the Faroese fishery but have almost been phased out in recent years.

- ***Effort Regulation.*** Maximum total effort measured in terms of days at sea, for each of the fleet segments is fixed annually. For the non-artisan fleet segments, the total effort is subsequently allocated equally between vessels in each of the fleet segments. For the artisan fleet, 60 percent of the total effort is allocated to full-time fishermen who receive individual and equal sized effort. The part-time fishermen, in contrast, fish on a common effort quota, where the fishery is closed when the quota is used.

- ***Tradability of Effort.*** The days at sea are tradable within and between the non-artisan fleet segments. For the trade segment in between, there is a need to consider differences in fishing power across vessel sizes and gear types. The differences in fishing power are accounted for through effort conversion keys detailed in governmental orders (see below).

- ***Area Closure*** based on access rights to fishing areas. The regulation is detailed by fleet segments and gives priority to smaller vessels and long-line fisheries. The artisan fleet, which only includes jugs and long-line fisheries, thus has no access limitations except for some smaller areas that are closed for all fisheries during spawning time. The medium-sized liners are excluded

from the areas within 6 nm off the coast, and the largest liners from the areas within the 12 nm limit. Trawlers are in general excluded from the entire continental shelf area through a number of boxes closed for trawling. However, there is a new rule available for smaller trawlers, allowing a summer fishery targeting flatfish and using trawls with sorting grids within a number of designated shelf areas. Gill netting is restricted to deep water fisheries targeting Greenland halibut and monkfish.

- ***Additional Technical Regulation Measures include:*** Mesh size regulation detailed by fisheries, general discard ban including real time rules for changing fishing area when discard occurs; and minimum landing sizes.

Regarding the tradability of effort, the single vessel can meet restrictions from effort regulations by purchasing days at sea from other vessels. Conversion points are based on physical characteristics. The conversion factors relevant for pair trawlers are shown in Table 1.

Table 1. Conversion Factors regarding the Purchase/Sell between Vessels

	Seller			Purchaser		
	(A)	(B)	(C)	(A)	(B)	(C)
Purchase of Days at Sea						
(A) Pair Trawler ≥ 1,500	1.00	1.17	1.40	0.71	0.86	1.00
(B) Pair Trawler 1,100-1,499	0.86	1.00	1.20	0.83	1.00	1.17
(C) Pair Trawler < 1,100	0.71	0.83	1.00	1.00	1.20	1.40
(D) Trawler ≥ 300	0.64	0.75	0.90	1.11	1.33	1.56
(E) Trawler < 300	0.54	0.63	0.75	1.33	1.60	1.87
(F) Line Vessel ≥ 600	0.71	0.83	1.00	1.00	1.20	1.40
(G) Coastal Fishing Vessel 300–599	0.43	0.50	0.60	1.67	2.00	2.33
(H) Coastal Fishing Vessel 200-299	0.32	0.38	0.45	2.22	2.67	3.11
(I) Coastal Fishing Vessel 120-199	0.25	0.29	0.35	2.86	3.43	4.00
(J) Coastal Fishing Vessel < 120	0.18	0.21	0.25	4.00	4.80	5.60
Sell of Days at Sea						
(A) Pair Trawler ≥ 1,500	1.00	0.86	0.71	1.40	1.17	1.00
(B) Pair Trawler 1,100-1,499	1.17	1.00	0.83	1.20	1.00	0.86
(C) Pair Trawler < 1,100	1.40	1.20	1.00	1.00	0.83	0.71
(D) Trawler ≥ 300	1.56	1.33	1.11	0.90	0.75	0.64
(E) Trawler < 300	1.87	1.60	1.33	0.75	0.63	0.54
(F) Line Vessel ≥ 600	1.40	1.20	1.00	1.00	0.83	0.71
(G) Coastal Fishing Vessel 300–599	2.33	2.00	1.67	0.60	0.50	0.43
(H) Coastal Fishing Vessel 200-299	3.11	2.67	2.22	0.45	0.38	0.32
(I) Coastal Fishing Vessel 120-199	4.00	3.43	2.86	0.35	0.29	0.25
(J) Coastal Fishing Vessel < 120	5.60	4.80	4.00	0.25	0.21	0.18

Source: Løkkegaard et al. (2004).

Conversion factors for pair trawlers are calculated as length x breadth x depth x engine power (hp)/1,000. For example, the purchase of 15 days at sea by a pair trawler with 1,200 points from a trawler with 200 points means that the former will get 24 additional days at sea (15 x 1.60). In this case, the conversion factor is high (1.60) meaning that the pair trawler with 1,200 points will obtain 39 days at sea in total following its purchase. As a consequence of that, the pair trawler with 1,200 points will be able to put more effort into the fishery and increase its catch. On the other hand, the sale of 15 days at sea from a pair trawler with 1,000 points to a coastal fishing vessels with 350 points means that the latter will obtain 9 additional days at sea (15 x 0.60). In this case, the conversion factor is low (0.60) meaning that the coastal fishing vessel with 350 points will obtain 9 days at sea in total following its purchase. As a consequence of this, the coastal fishing vessel with 350 points will be able to put less effort into the fishery while decreasing its catch.

In The Faroe Islands, the fishing authorities have the task of continuously updating the above conversion factors. According to the Fish Control Unit of the Faroese Ministry of Fisheries, on the whole there has been a steady increase in the purchase of days at sea by pair trawlers larger than 400 hp throughout 2001-2003, whereas the sale of days at sea increased from 2001 to 2002, and decreased considerably in 2003 following the change of vessels. Løkkegaard *et al.* (2004) observed that Faroese pair trawlers above 400 hp registered a high level of purchase and sale of days at sea during 2001-2003.

Løkkegaard *et al.* (2004) claimed that the main pair trawlers' domestic fishing activities take place in the Faroese Plateau and to a minor extent in the Faroese Bank. Their fishing activities inside the Faroese Exclusive Economic Zone (EEZ) are subject to effort regulations.

A summary of the situation of Faroese pair trawlers larger than 400 hp during 2001-2003 is given in Table 2.

Table 2. Statistics of Faroese Pair Trawlers larger than 400 hp, 2001-2003

	2001	2002	2003	***Average***
Number of Full-time Pair Trawling Fishermen	333	313	318	322
Effort (1,000 days at sea)	7	7	6	7
Pair Trawling Fishing Vessels:				
Number of Vessels	30	28	28	29
Average Tonnage (GT/GRT)	349	364	356	352
Average Engine Power (kilowatt)	1,231	1,326	1,278	1,262
Average Length (metres)	37	40	38	38
Average Insurance Value (DKK million)	11	12	15	13
Landing Value (DKK million):				
Cod	85	67	57	70
Haddock	37	41	20	33
Saithe	169	179	127	158
Other	48	33	43	41
Total	339	320	247	302
Share of Total Landing Value (%)[1]	36	34	26	32
Landing Quantity (1,000 tonnes):				
Cod	4	4	3	4
Haddock	3	4	3	3
Saithe	34	37	34	35
Other	12	10	8	10
Total	53	55	48	52

Source:
Hagstova Føroya (Faroe Islands Statistics).
Rasmussen & Weihe (2006), Accounts of the Faroese Fishing Fleet.
Notes:
[1] This value includes the Faroese distant water fishery during the period accounting for 13% of the pair trawling segment of total catches.

It appears that an average of 322 full-time fishermen were active in the pair trawling fleet during the three-year period. On average, each vessels was 244 days at sea per year. The 29 vessels had an insurance value of DKK 13 million on average. The average tonnage amounted to 352 GT/GRT and the average engine power 1,262 kilowatts. The highest activity measures in turnover of Faroese pair trawlers were registered in 2001. Saithe (*pollachius virens*) was the main species constituting over 50 percent of the total value of landings. The remaining catches were made up of cod (*gadus morhua*), haddock (*melanogrammus aeglefinus*), and a number of other species. The total value of landings of cod, haddock, saithe and other species averaged DKK 302 million annually in the period. Overall, landings of pair trawlers accounted for 32 percent of the total landing value of all species caught by fishermen in Faroese waters from 2001 to 2003. By including catches in distant waters, the pair trawler fishery makes up 13 percent of the whole Faroese fishery.

3. Size of the Resource Rent

3.1. Size of the Resource Rent in 2001-2003

The economic rent of the existence of a fishery for society can be measured by the resource rent, which shows *"the return left to the remuneration of capital and labour corresponding to the level in other businesses"*. Theoretically, the resource rent is the difference between the total revenues obtained from the fishery resource, and the total costs of production with capital and labour valued at their opportunity costs. The resource rent can have either a positive or negative value. A positive resource rent gives a larger remuneration of capital and labour in the fishery than in other sectors, whereas a negative resource rent indicates that there is lower remuneration of capital and labour than in other businesses.

The opportunity cost concept refers to what fishermen could be earning if they were employed in a sector other than the pair trawling industry. The resource rent will be positive if the fishery produces higher remuneration of labour and capital than in other sectors. The factor remuneration that the pair trawler fishery generates above other industries can be seen as a profit of the fish resource.

Fishery management has a significant impact on the possibility of creating resource rents (OECD 1997 and FAO 2000). If its potential is not well understood and if there are no limits on fishing effort, this wealth will not be realised. Hence, potential resource rents can be wasted on excess capacity, leading to the depletion of fisheries resources. According to fisheries economic theory, open access would yield no economic rent, whereas a sole owner would maximize economic rent.

In our paper, the resource rent is calculated as follows: the turnover minus costs (excluding labour and capital), labour costs in alternative use, and capital costs in alternative use. The resource rent is calculated both *before* the deduction of public expenses (type A), as well as *after* the deduction of these net expenses in other businesses (type B). Net public expenses are made up of subsidies and fisheries management costs. Both turnover and costs are known from the account statistics of the Faroese public authorities.

Labour costs in alternative use indicate what salary the Faroese pair trawler workers may receive, provided they find employment in other sectors. In this paper, the aver-

age annual salary is calculated for both crew and captain, assuming 30 percent of the total labour costs are given to the captain while the remaining 70 percent is given to the fishermen. Remuneration of labour in alternative use is made up of both unskilled workers who attended basic school (i.e. fishermen) and skilled labour that did short more advanced studies (i.e. captains). Calculations remain valid, provided fishermen's rent can actually be found in alternative employment; that is, provided there is full employment. Provided employment opportunities in alternative use are limited, labour costs in alternative use are over-estimated and the resource rent underestimated. Capital costs in alternative use indicate investment in, for example, shares or bonds.

In the present report, the capital stock is given by vessels' insurance value, including the value of fishing vessels; i.e. hull, engine, tools, etc. but without fishing rights. Values of fishing rights are handled in connection with the distribution of resource rent, as they have no influence on the size of the resource rent, only on the distribution.

The average remuneration of labour in actual use is equal to the average crew share, which is known from the Faroese state chartered accountants, Rasmussen & Weihe (2006).

Average remuneration of capital in actual use is obtained by subtracting fuel costs (DKK 35 million), other running costs, vessel costs, crew share and depreciation from the value of landings. These values are known from Rasmussen and Weihe (2006).

Average remuneration of capital in alternative use is calculated as 6 percent of the insurance value. The insurance value of the pair trawling fleet is known from the statistics of the Faroese Insurance Company (2006).

The calculation of remuneration of labour in alternative use are based on an average annual wage of crew members with a basic Faroese lower secondary school qualification on DKK 179,000 and an average annual wage of captains with a short more advanced qualification on DKK 205,000.

Table 3 shows the size of the resource rent generated by the Faroese pair trawler fishery *before* the deduction of net public expenses.

Table 3.	The Size of Resource Rent before Deduction of Net Public Expenses (Type A), Average 2001-2003	
	DKK Million	***Percentage (%)***[1]
Remuneration of Capital	41	13
Remuneration of Labour	**123**	**41**
Total (I)	164	54
Remuneration of Capital in Alternative Use	21	7
Remuneration of Labour in Alternative Use	**59**	**19**
Total (II)	80	26
Resource Rent (Type A) (III = I – II)	84	28

Source: FOI. Rasmussen & Weihe (2006), "*Accounts of the Faroese Fishing Fleet*" State Chartered Accountants.

On average, actual total factor remuneration amounted to DKK 164 million during the 2001-2003 period; whereas total factor remuneration in alternative use amounted to DKK 80 million. The difference between these two values (DKK 84 million) gives the current resource rent (type A) of the Faroese pair trawler fishery, which corresponds to 28 percent of the total value of landings. Thus, a relatively high resource rent is obtained. The positive resource rent should be interpreted in the context of the effort regulation system working efficiently, coupled with the fact that the biology has been excellent throughout the period with an extraordinarily high recruitment of fish during 2001-2003 compared to the previous 5-year period.

Fishermen are paid according to the collective agreement between the Faroese Fishermen's Association (FF) and the Ship-owners' Association. Contrary to most other wage systems, the fishermen's compensation is directly related to the value of their production, i.e. catch value. A typical collective agreement provides the fishermen with a 27 percent share of the total catch value, which is then divided among crew members. Fishermen further receive vacation pay representing 12 percent of one share. Ship-owners also pay a bonus to the officers, so that the total net share a ship-owner pays, is between 35-40 percent.

Because such a wage system can create variations in fishermen's incomes, it is required by law to provide fishermen with a minimum amount of income, which is supplemented by public funds. This minimum incomes system began in 1950. Currently, the wage system guarantees the fisherman a minimum wage equal to the daily pay of an unskilled labourer who works 8 hours a day.

Table 4 illustrates the calculation of the resource rent (type B) *after* the deduction of net public expenses to the fishery. The net public expenses represent the total public expenses to the whole Faroese fishery, weighted with the pair trawler fishery share of total landings. Net public expenses consist of subsidies and fisheries management costs. Subsidies include closure, breaking up, renewal, modernizing, and cost-reducing transferring, whereas fisheries management costs constitute costs of control, biological surveys and advice.

The statistical figures on subsidies and fisheries management costs have been provided by the Faroese National Bank (2006)

Table 4. Size of Resource Rent after Deduction of Net Public Expenses (Type B), Average 2001-2003

	DKK million
Resource Rent excluding Public Expenses (Type A)	84
Net Public Expenses[1]:	
Subsidies	-5
Fisheries management costs[2]	**-20**
Total	-25
Share of landing value	8%
Resource Rent including Public Expenses (Type B)	59
Share of landing value	20%

Source: The Faroese National Bank (2006).

During the 2001-2003 period, net public expenses amounted to DKK 25 million, corresponding to 8 percent of the total landing value. Measured in relation to landing value, the resource rent *after* the deduction of net public expenses remained exceptionally high in The Faroe Islands averaging DKK 59 million, corresponding to 20 percent of the total landing value.

3.2. Factors affecting the Size of the Resource Rent

The resource rent identified above is only for 2001-2003, and might not necessarily be representative of a long time span. The resource rent might be over-estimated if prices are excessively high in the considered period. In addition, if the stock is over-exploited, the resource rent might fall in the future due to decreasing stock size, thereby dropping in future catch potential.

Table 5 shows the most important factors influencing the size of the resource rent compared to the previous 5-year period.

Table 5. Factors affecting the size of the resource rent

Biological Factors:	
Exploitation (%)	
Under	0
Full	34
Over	52
Depleted or Recovering	0
Unknown	**14**
Total	100
Recruitment:	
% Change during 1996-2000 compared to 2000/2003 period	+81
Economic Factors:	
Average Price for 1996-2000 period (DKK per kilo):	
Saithe	5.4
Cod	13.1
Haddock	9.6
Average Price for 2001-2003 period (DKK per kilo):	
Saithe	4.5
Cod	17.3
Haddock	10.8
Price Change (% from 96/00 to 01/03)	+2

Source: Hagstova Føroya (Faroe Islands Statistics).

The spawning stock biomass of the main species, saithe was well above the level corresponding to the precautionary approach (85,000 tons). In 2002, the fishing mortality rate was calculated to be close to its precautionary approach level and below the critical boundary value level.

During the 2001-2003 period, 34 percent of the landing values of Faroese pair trawlers came from fully exploited fish stocks; 52 percent from over-exploited stocks; and the remaining 14 percent of landings originated from stocks with an unknown status.

The Faroese Plateau cod stock is estimated to be within safe biological limits. Since the crisis in 1993-1995, the spawning stock biomass corresponds to the precautionary approach and in 2002 it is considerably above at 68,000 tons. Recruitment of cod was high in 1997 and 1999; among the five highest since 1960. Fishing mortality was high in 2002 and over fishing mortality rates corresponding to the precautionary principle.

The state of the spawning stock biomass of the Faroese Bank cod is not known with certainty. There are indications of a remarkable stock rise during 1996-1998 compared to the period dating back to 1983. In 1999-2000, the stock shrank apparently, but subsequently returned to a high level.

The haddock spawning stock biomass was well above the level corresponding to the precautionary approach. In 2002, the fishing mortality rate was assessed to exceed the fishing mortality level corresponding to the precautionary approach and close to the critical limit.

The biological factors are proof that the resource rent gained in the 2001-2003 period might not necessarily be maintained in the future. The spawning stock biomasses are generally on secure levels, but fishing mortalities are too high.

Recruitment of the saithe, cod and haddock stocks relevant for the Faroese pair trawlers registered a substantial 81 percent increase in the 2001-2003 period, compared to the previous 1996-2000 period. This result was due to the fact that the 2001-2003 years biologically were more favourable in relation to the previous 5-year period.

During the 2001-2003 period, the price of cod and haddock increased by 32 and 13 percent, respectively. The reason was the appreciation of the EUR against the USD. On the contrary, the price of saithe decreased by 17% from DKK 5.4 per kilo to DKK 4.5 per kilo during the two periods. This fall might be the result of increasing competition from Alaska Pollack in the European market from the US and Russia. Overall, there has been an increase in the average price of 2 percent, mainly due to the pair trawlers dependence of saithe. Average prices of fish caught by Faroese pair trawlers increased to a lesser extent than prices of other types of fish in the market. As Alaska Pollack is expected to remain in the European market in the future, the price of saithe is not expected to return to the same level as in former years. The size of the resource rent is affected by this as most commercial species like cod, haddock and saithe caught by pair trawling vessels are considered fully- or over-exploited, and as there are limited possibilities for acquiring more fishing opportunities, there is little room for an increase in catches of traditional species. Fishing mortality for the Faroese Plateau cod in 2003 is more than twice the level corresponding to the precautionary principle. Therefore, the present size of the resource rent cannot be maintained in the long run.

3.3. Instruments Needed to Potentially Increase the Resource Rent

Even though the resource rent calculated above is relatively high, there might still be room for improvement. This is further underlined by the fact that the high resource rent is explained by favourable biological conditions of the relevant stocks in the considered period. Theoretically, several different types of management are potentially able to increase the resource rent. This is also the case for the present days at sea regulation, provided that it is used in the best possible way economically. The resource rent can be increased by improving management according to the following criteria:

1. Fish stocks shall be managed in a sustainable way, both the spawning stock biomass and fishing mortality rate;
2. Fleet capacity should be brought in agreement with economy, i.e. total costs should be minimized; and
3. Management shall ensure an automatic structural adjustment.

The management of the Faroese pair trawlers can be improved in the long run by decreasing fishing mortality to the precautionary level (Re 1). Furthermore, the effort management can be designed in such a way as to take technological development (effort creep) explicitly into account (Re 2). For example, by decreasing the total effort every year on a rate corresponding to an assessed increase in catch potential provided by technological improvements. The effort management can further be designed to ensure continuous structural adjustment (Re 3). This is already the case today, but the system with conversion factors in the trade in days at sea needs continuous updating in order to secure free and efficient trade.

What is also particularly important about the Faroese model, however, is that the fishermen accept the system, and trust it. They willingly supply catch data, which is therefore accurate, and there are no discards to skew stock assessments. Therefore, Faroese scientists are confident that they have good data on which to fine tune the system, which can include the closing of certain grounds for limited periods of time.

4. Allocation of the Resource Rent

The resource rent allocation between capital, labour and the public sector can be calculated individually as:

(i). Labour:
+ remuneration of labour in actual use
- income tax revenue in actual use
- remuneration of labour in alternative use
+ income tax revenue in alternative use

Labour Share of Resource Rent

(ii). Capital:
+ profits from financial expenses and tax
- corporate tax revenue
- financial earnings in alternative use
- corporate tax revenue from financial earnings in alternative use

Capital Share of Resource Rent

(iii). The Public Sector:
+ income tax revenue
+ corporate tax revenue
- subsidies to the fishery
- fisheries management costs

Public Sector Share of Resource Rent

The capital and labour share of the resource rent is calculated without taking into account the allocation between active and retired fishermen. The selling of fishing rights from past to present fishermen is not included in the calculations.

To calculate the labour share of the resource rent, we know the value of remuneration of labour in actual and alternative use from Table 3 in Section 3. The labour share of the resource rent is compared with the number of full-time employees given in Table 2 in Section 2, knowing the average wage in the actual fishery and in alternative use. Income tax revenue is calculated on the basis of these average wages multiplied by income tax percentages. Income tax percentages in the fishery are identified and they correspond to the average wage level, as minimum deduction, fishermen's deduction and progressive tax is taken into account. Fishermen's deduction is assumed to be fully utilized.

To calculate the capital share of the resource rent, profits prior to financial expense and tax deduction are calculated after allowing for depreciation. Corporate tax revenue is calculated as the corporate tax percentage multiplied by profits after financial expenses. Financial earnings in alternative use are identified as six percent of the vessels insurance value specified in Section 3, and corporate tax revenue in alternative use is calculated like the corporate tax percentage multiplied by financial earnings.

To calculate the public sector share of resource rent income and corporate tax revenue according to the above is used. Subsidies to the fishery and fisheries management costs are known from Section 3.

The Faroese income tax system for is progressive, and income tax percentages are calculated with regards to minimum deduction, fishermen's deduction and progression. Also it is determined for the average salary level in the fishery and for labour in alternative use. Income tax rates in actual and alternative use are calculated on the basis of information from The Faroe Islands Customs and Tax Authority (2006). These are as follows: (i) income tax rate for captains in actual use (44 percent); (ii) income tax rate for the crew in actual use (32 percent); income tax rate for captains in alternative use (40 percent); and income tax rate for the crew in alternative use (38 percent).

The Faroese corporate tax rate as provided by The Faroe Islands Customs and Tax Authority (2006) was 20 percent.

Income tax revenue is obtained by subtracting the income tax of labour in alternative use from the income tax of labour in actual use. Actual and alternative income tax revenues for the two types of average salaries (i.e. fishermen's and captains') are calculated given tax rates, allowances and progressive intervals. The two types of paid income tax are weighted with 30-70%. The Faroese pair trawler fishery is characterized by a tax deduction system for fishermen. This allowance is distributed among crew members (i.e. fishermen and captains), and it is equal to 15 percent of an income. The total can never exceed more than DKK 75,000 per crew member annually.

The allocation of resource rent generated by pair trawlers among capital owners and workers *after* the deduction of net public expenses (type B) during the 2001-2003 period is illustrated in Table 6.

Table 6. Allocation of Resource Rent, Average 2001-2003		
	DKK Million	***Percentage (%)***
Net Remuneration of Capital	17	
Net Remuneration of Labour	43	
Tax Earnings	24	
Net Public Expenses to the Fishery	**-25**	
Resource Rent (Type B)	59	
Percentage Distribution of Resource Rent		
Capital		29
Labour		73
Public Sector		**-2**
Total		100

Source: FOI

Tax earnings amounted to DKK 24 million and net public expenses averaged DKK 25 million, which means that the Faroese public sector obtained a *negative* share of 1 percent of the resource rent *after* the deduction of net public expenses. Net remuneration of capital and labour amounted to DKK 17 million and DKK 43 million, respectively. This means that 29 percent of the resource rent produced by the pair trawler fishery was allocated to capital and 73 percent to labour. Therefore, the Faroese workforce obtained the highest percentage share of the resource rent generated by the pair trawler fishery.

If management systems are in place in such a way as to enable resource rents to be generated, the public authorities will have to decide on their aim in terms of how much rent they wish to extract from the pair trawler fishery. As shown above, the general tax system gives an initial allocation. Therefore, the public authorities' decision is on how much resource rent should be re-allocated. The extreme possibilities are for the public authorities to leave all the rent within the fishing industry, or for the public authorities to take all the rent. The former might be considered inequitable while the latter is likely to be difficult to achieve in practice, as it involves the public authorities in excessive compliance expenditure. A possible practical solution might appear somewhere in between. Leaving some rent within the industry will give it an incentive to develop the efficiency of fishing-based activities. Moreover, the compliance problem may be lessened by giving the industry a stake in the future of the resource.

Furthermore, owners of pair trawling vessels need to obtain an additional share of the resource rent in order to be interested in undertaking potential risky investments in the

fishery. The crew also needs a share of the resource rent to be willing to undertake dangerous jobs away from their families for longer periods of time.

Re-allocation of resource rents raises challenging, but important, policy issues concerning: (i) who owns the resource; (ii) who is to be allowed to exploit the resource and on what terms; and (iii) what division of rents between owners and exploiters is considered equitable.

The re-allocation of resource rent to the public sector is primarily paid for by the labour force in the Faroe Islands. It bears 70 percent of the burden; whereas capital owners bear the remaining 30 percent.

In theory, all of the resource rent can be collected by the public sector through selling fishing rights at an auction. This collection process takes place provided the auction system works and price formation can take place under perfect competition. However, the opportunity of entering the fishery is limited in many cases. The consequence is that, there may be few purchasers in the fishery as they are not necessarily competing with each other.

In practice, the resource rent can be re-allocated from capital and labour to society. This can be done in various ways, eg. by phasing out subsidies to the fisheries sector, by collecting fees on fisheries management costs or by introducing tax on landings. However, the possibility is limited in situations where the current generation of fishermen has purchased their fishing rights from former generations of fishermen.

The potential of increasing public income by applying other types of user payments, as well as by taxes, is illustrated in Table 7 assuming unchanged structure and activities in the pair trawler fishery. Subsidies and fisheries management costs are seen in Table 4.

Table 7.	Potential Increase in Net Public Revenue by Re-allocating Resource Rent	
		DKK million
User's Payments:		
Abolition of subsidies		5
Collection of fisheries management costs		20
Abolition of fishermen's deductions		14
Landing Taxes:		
Introduction of tax on the same level as Iceland (2008)		6
Introduction of tax on 5%		15
Introduction of tax on 10%		30

Source: FOI.

The collection of fisheries management costs and the abolition of fishermen's deduction average DKK 20 and 14 million, respectively. Contrarily, the abolition of subsidies has a minor impact amounting to DKK 5 million only. The introduction of a landing tax at the same level as the tax of ownership of individual quotas in Iceland, when it is fully implemented in 2008, has a relatively modest effect on net public revenue corresponding to an average DKK 6 million. The introduction of a tax of 5 percent and 10 percent of total landing value of pair trawler vessels will increase the net public revenue up to DKK 15 million and DKK 30 million, respectively. Thus, the increase in landing tax will raise net public revenue proportionally, but it is also assessed that the fishing activities of Faroese pair trawlers would be affected.

5. Conclusions

In this case study, the size and allocation of the resource rent of the Faroese pair trawler fishery during the 2001-2003 period was analysed. The size of the resource rent *before* and *after* the deduction of net public expenses had a significant positive value, ensuring that the management system of the Faroese pair trawler fishery works well. The Faroese effort regulation is characterized by pair trawling vessels being allowed to fish for a certain number of days at sea. The other management instrument is of a restrictive type, where selected areas of the fishery are closed down during given periods of time. The Faroese effort regulations are implemented through the use of individual and transferable days at sea.

However, it is difficult to control "effort creep" due to technological developments. Most effort systems enable resource rents to emerge for a certain period of time, but the rents are gradually eroded as inputs are replaced, unless management continually updates the scheme.

The economic return of society is measured by the resource rent, which shows the return left to remuneration of capital and labour above the level in other businesses.
During the 2001-2003 period, the resource rent *before* the deduction of net public expenses generated by the Faroese pair-trawling fishery averaged DKK 84 million corresponding to 28 percent of the total value of landings. The resource rent *after* the deduction of net public expenses averaged DKK 59 million corresponding to 20 percent of the total landing value. A larger resource rent may be obtained in the long run by limiting fishing mortality to precautionary limits and ensuring that total days at sea are continously decreased, following technological developments.

The allocation of the resource rent between capital, labour and the public sector, *after* the deduction of net public expenses to the fisheries, shows that the Faroese public sector obtains a *negative* share of 2 percent of the resource rent created by the Faroese pair trawler fishery. Hence, even though society owns the resources, it bears more costs than benefits from it.

The resource rent can be re-allocated from capital and labour to the society in several ways. These include introducing a tax on landings, phasing out subsidies to the fishing sector and collecting fees on fisheries management costs. However, the possibility is limited in situations where the current generation of fishermen have purchased and paid for their fishing rights from previous generations of fishermen.

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THE SWEDISH PELAGIC FISHERY

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1. Introduktion

Stora delar av svenskt fiske karaktäriseras idag av dålig lönsamhet och sviktande bestånd. Den negativa utvecklingen har inneburit att en diskussion om alternativa förvaltningsformer har tagit fart. I Nordiska Rådets projekt ”Fokus på ekonomin i nordiskt fiske” jämförs ekonomin i olika förvaltningssystem i norden. Den svenska förvaltningen illustreras i projektet med det pelagiska segmentet för fartyg över 24 meter.

Det pelagiska fisket är det enskilt största segmentet i svenskt fiske räknat som landningar och landningsvärde, och det är inom det pelagiska fisket som Sverige är mest konkurrenskraftigt på den internationella marknaden (Hammarlund 2005). Fisket karaktäriseras av stora fartyg med hög flexibilitet vad gäller fångstarter och fiskeområden. Flertalet av de drygt 50 fartygen har sina hemmahamnar på den svenska västkusten, men fisket bedrivs i såväl Östersjön som i Kattegatt/Skagerrak, Nordsjön och Atlanten. Efter en period med stor framtidstro och stora investeringar under andra halvan av 1990-talet karaktäriseras segmentet idag av överkapacitet och dålig lönsamhet. Fisket förvaltas med hjälp av fångstransoner för varje tvåveckorsperiod, men under 2005 har Fiskeriverket i samarbete med industrin lagt fram ett förslag som innebär en förvaltning med individuella försäljbara fångstkvoter.

Studien inleds med en beskrivning av svenskt fiske och fiskeriförvaltning i kapitel 2 följt av en fördjupad genomgång av det pelagiska fisket i kapitel 3. I kapitel 4 beräknas resursräntan i segmentet och vidare diskuteras i vilken mån faktorer utanför förvaltningssystemet har påverkat den ekonomiska utvecklingen. Kapitlet innehåller också en diskussion om de teoretiska förutsättningarna för att resursränta ska uppstå i det nuvarande förvaltningssystemet, och i vilken mån förutsättningarna förändras genom det förslag på alternativt förvaltningssystem som lagts fram. I kapitel 5 analyseras hur segmentets bidrag till ekonomin fördelas mellan näring och myndigheter, och resursräntan beräknas med hänsyn taget till samhällets kostnader för kontroll m.m. av fisket.

2. Fakta om svenskt fiske

Svenskt fiske sker till övervägande del på de nio arterna torsk, sill, skarpsill, makrill, tobis, nordhavsräka, havskräfta, ål och rödtunga. Dessa arter står för 90 procent av det svenska fångstvärdet, men det dominerande fisket är det efter torsk och de pelagiska arterna som tillsammans står för cirka 75 procent av fångstvärdet (Fiskeriverket 2005c). Landad volym och värdet på landningarna i genomsnitt under perioden 2001 till 2003 framgår av tabell 1.

Tabell 1. Landad vikt och landningsvärde i svenskt fiske, genomsnitt 2001-2003

Art	Ton	mSEK
Rödspätta	0,5	7,952
Torsk	19,3	271,750
Skarpsill	81,2	104,568
Lax	0,5	7,658
Sill	103,5	239,590
Makrill	4,9	38,896
Kolja	0,9	10,423
Sej	1,8	12,549
Vitling	0,2	1,223
Blåvitling	28,7	26,804
Havskräfta	1	85,740
Räka	2,1	89,653
Tobis	42,9	50,881
Övrigt	9,2	92,708
Totalt	296,7	1 040,396

Källa: Beräkningar utifrån EAEF(2005)

2002 fanns det cirka 2000 licensierade fiskare som bedrev fiske i havet (Det fanns också cirka 200 fiskare som bedrev sötvattensfiske). Det viktigaste fiskeområdet är Östersjön där 45 procent av den totala fångstvolymen tas. 15 procent av fångsterna tas i Skagerrak, 6 procent i Kattegatt, 12 procent i Nordsjön, och 22 procent i Nordatlanten (EAEF 2005).

2.1. Förvaltning

Nedan görs en genomgång av svensk fiskeriförvaltning med fokus på begränsningar i kapacitet och tillgänglighet till fisket. Svenskt fiske förvaltas sedan 1995 inom EU:s gemensamma fiskeripolitik (GFP), och utvecklingen i svensk förvaltning följer därför generellt utvecklingen i den gemensamma politiken. Avsnittet behandlar inte hur GFP fungerar och inte heller skillnader mellan GFP och tidigare regleringar.

Ett mål med den gemensamma fiskeripolitiken är ett långsiktigt hållbart fiske. För att uppnå målet är de årliga fångstkvoterna (TAC) ett viktigt instrument. Fångstmöjligheterna för den svenska flottan bestäms genom förhandlingar inom GFP där den totala fångstmängden för EU bestäms. Sverige har sedan en bestämd andel av denna. Hur den svenska fångstkvoten fördelas inom landet bestäms däremot nationellt. Hur detta görs skiljer sig åt för olika fisken i Sverige, men en vanlig metod är att fartygens landningar begränsas genom en- eller tvåveckorsransoner (Fiskeriverket 2003).

EU:s strukturpolitik syftar till att modernisera fisket och höja produktiviteten. Ett medel för att uppnå detta har varit investeringsstöd till moderniseringar och nybyggnation av fartyg, och bidrag för skrotning av fartyg. Dessa stöd blev tillgängliga för svenska fiskare i och med EU-medlemskapet 1995. Investeringsstöden har sedan successivt avvecklats, och genom reformen av den gemensamma fiskeripolitiken 2003 ligger fokus numera på bevarandeåtgärder och en minskning av flottans kapacitet. Till och med 2003 reglerades flottans kapacitet inom strukturpolitikens så kallade fleråriga utvecklingsprogram, men genom reformen lades ansvaret för flottan över på medlemsländerna. Det finns dock ett tak för hur stor kapaciteten får lov att vara. Detta innebär att det inte är möjligt att föra in ny kapacitet i flottan utan att motsvarande kapacitet i form av andra fartyg förs ut.

Tillträdet till svenskt fiske är begränsat genom att det krävs en licens som utfärdas av Fiskeriverket för att få lov att bedriva yrkesmässigt fiske. En licens är giltig för fiske i alla tillgängliga vatten. Detta innebär att en svensk licensierad fiskare fritt kan byta fiskeinriktning (Fiskeriverket 2003). Eftersom en yrkesfiskarlicens gäller för allt fiske kan med vissa undantag alla svenska fiskare fiska på alla tillgängliga kvoter tills dessa är uppfiskade.

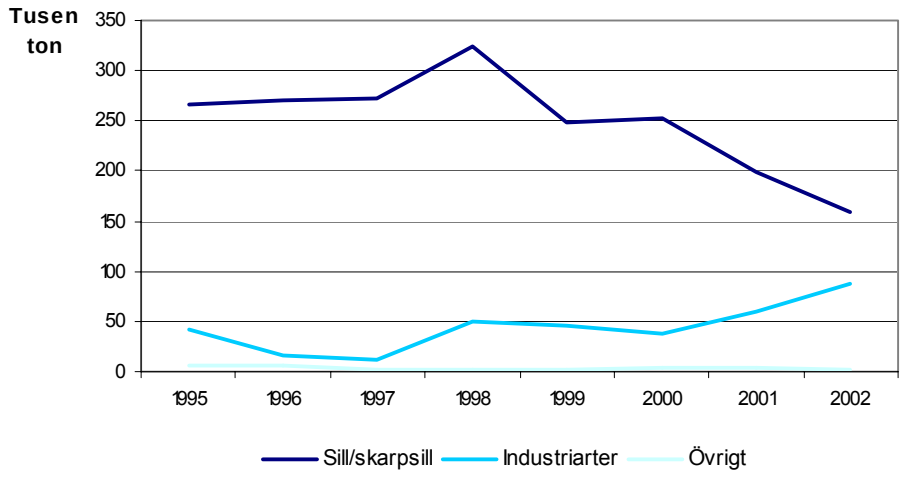
Fisket förvaltas vidare med ett stort antal tekniska regleringar som reglerar när, var och hur fisket får bedrivas. De tekniska regleringarna är framtagna för att passa enskilda fisken och fiskbestånd och varierar därför kraftigt mellan olika fisken. Exempel på tekniska regleringar som används är effortbegränsningar i form av begränsat antal fiskedagar, stängda områden, maskstorlekar och minimistorlek på landad fisk.

3. Det pelagiska segmentet >= 24 meter

Det pelagiska segmentet delas för ekonomiska analyser ofta upp i fartyg som är minst 24 meter och fartyg under 24 meter. Den analys som görs i studien behandlar enbart fartyg som är minst 24 meter. Under perioden 2001 till 2003 fanns i genomsnitt 57 aktiva fartyg i segmentet. Den sammanlagda sysselsättningen ombord var 344 personer. Genomsnittsfartyget hade ett tonnage på 379 bruttoton och en motorstyrka på 1138 kW.

Fartyg i det pelagiska segmentet används framför allt för att fiska sill, makrill och industriarter. De viktigaste industriarterna är skarpsill, tobis och blåvitling. Ungefär 70 procent av de totala fångsterna används som djurfoder eller går till industriändamål (EAEF 2005). Fisket sker huvudsakligen med trål, men även not används. Det traditionella svenska fisket har varit efter sill, skarpsill och makrill, men industriarter som tobis och blåvitling har fått en ökad betydelse under senare år. I figur 1 beskrivs fångsternas utveckling mellan 1995 och 2002.

Figure 1. Utveckling av fångsterna 1995-2002



Källa. Waldo (2005)

Som framgår av figuren har andelen sill/skarpsill i fångsterna minskat avsevärt under perioden. Kvoterna har totalt sett minskat med cirka 25 procent mellan 1995 och

2002, vilket innebär en minskning från 360 000 ton till 270 000 ton. Dessa siffror innehåller även kvoter för lodda i Grönländskt vatten, vilket under normala omständigheter inte är lönsamt att fiska för svenska fartyg (Fiskeriverket 2005a). Det traditionella fisket efter sill och skarpsill i Östersjön och Kattegatt/Skagerrak har fått minskade kvoter med ungefär 170 000 ton (Fiskeriverket 2005a).

Fartygen i det pelagiska segmentet är geografiskt rörliga och fiskar i Östersjön, Kattegatt, Skagerrak, Nordsjön och Atlanten. Ungefär hälften av den svenska sillkvoten 2003 är för fiske i Östersjön, cirka 40 procent är för Skagerrak/Kattegatt, medan resterande kvoter gäller för Nordsjön och Norska havet. Nära 80 procent av den svenska skarpsillkvoten är i Östersjön och övrig kvot gäller till största delen Skagerrak/Kattegatt. Den svenska makrillkvoten är inte uppdelad på havsområden men fick fram till och med 2005 inte fiskas på norskt vatten. Fisket efter tobis sker på en gemensam EU-kvot i Nordsjön.

Sammanfattande statistik över segmentets storlek, fångster och fångstvärden ges i tabell 2.

Tabell 2. Statistik över pelagiskt fiske

	Genomsnitt 2001-2003
Antal fiskare	344
Fartyg – totalt för segmentet	
Antal	57
Tonnage	21 733 GT
Maskinstyrka	65 233 kW
Landningsvärde, mSEK	
Sill	221,3 mSEK
Skarpsill	95,4 mSEK
Makrill	36,8 mSEK
Tobis	50,9 mSEK
Blåvitling	26,8 mSEK
Övriga arter	46,3 mSEK
Totalt	477,4 mSEK
Andel av landets totala landningsvärde	45,7 %
Volym	
Sill	94 200 ton
Skarpsill	74 000 ton
Makrill	4 800 ton
Tobis	42 500 ton
Blåvitling	28 600 ton
Övriga arter	7 300 ton

De pelagiska arterna är lågt värderade jämfört med andra viktiga fiskarter, men fångas i mycket stora volymer. Det pelagiska fisket med fartyg på minst 24 meter stod för 45,7 procent av det svenska fiskets totala landningsvärde.

Som diskuterats ovan fick svenskt fiske tillgång till investeringsstöd från EU genom det svenska EU-medlemskapet 1995. Under perioden 1995-1999 var investeringsviljan mycket hög i det pelagiska segmentet. Investeringar gjordes ibland annat i nya fartyg, ökad säkerhet för besättningen, och kyltankar för att öka kvaliteten på den landade fisken (Fiskeriverket 2005a). Under perioden 1995-2002 byggdes nio nya fartyg, även om inte alla beviljades stöd (Waldo 2005).

3.1. Förvaltning

Det pelagiska fisket förvaltas generellt inom samma ramar som övrigt svenskt fiske. För tillgängligheten innebär detta att det krävs licens för att börja fiska, men att en person med licens kan byta från en annan fiskeinriktning om han/hon anser att det är mer lönsamt att fiska i det pelagiska segmentet. Sedan 1997 har det funnits ett krav att nya fartyg endast får tillkomma om andra fartyg med motsvarande kapacitet förs ur segmentet, och sedan 2001 måste utförseln motsvara 130 procent av tillkommande kapacitet (Fiskeriverket 2005a).

Generellt begränsas fångsterna genom fartygsspecifika tvåveckorsransoner, men det finns ett antal undantag från de generella reglerna för hur fångsterna fördelas. Fisket efter makrill och efter sill i Nordsjön och Norska havet fick en ny fördelning under 2002 och 2003 då fartygsspecifika fångster specificerades utifrån historiskt fiske. Det är inte möjligt att köpa och sälja dessa. Sillkvoterna i Nordsjön och Norska havet är små och har varit svåra att följa upp och kontrollera, vilket var en bidragande orsak till den förändrade förvaltningen (Fiskeriverket 2005b).

Eftersom fiske sker på ett stort antal fiskarter och bestånd finns inga generella tekniska regleringar som gäller för allt fiske. Exempel på tekniska regleringar som används är fredade perioder och begränsningar på maskstorlekar.

4. Resursränta

Resursräntan beräknas som skillnaden mellan den ersättning som produktionsfaktorerna arbete och kapital (faktorersättningen) fått i fisket och den de hade fått vid en alternativ användning. Om fisket genererar högre ersättning till arbete och kapital än vad andra sektorer gör, så kommer resursräntan att vara positiv. Den faktorersättning som fisket genererar utöver vad andra näringar gör kan ses som en samhällsekonomisk avkastning på det värde fiskresursen utgör. Fiskets förvaltning har mycket stor inverkan på möjligheten att skapa resursränta (OECD 1997 och FAO 2000).

4.1. Förutsättningar för resursränta

Bedömningen av om det finns förutsättningar för att skapa en positiv resursränta i det pelagiska fisket utgår från de drivkrafter mot överinvesteringar som enligt ekonomisk teori finns i ett oreglerat fiske. Överinvesteringar driver upp kostnaderna och urholkar resursräntan.

Utgångspunkten är att det är rationellt för individen att investera i fisket så länge investeringen ger en högre avkastning än alternativet att investera i andra sektorer. Fritt tillträde till resursen innebär att fiskaren inte behöver ta hänsyn till den kostnad ett minskat fiskbestånd innebär för samhället. Detta leder till att investeringar är lönsamma för individen trots att de är olönsamma för samhället som helhet. Även om fisket som helhet förlorar på ytterligare fiske är beslutet rationellt för den enskilde fiskaren som får en del av sektorns vinster. Drivkraften att ta del av fiskresursen leder till överinvesteringar, hårt fiskade bestånd och dålig lönsamhet (en utveckling av den ekonomiska teorin finns i Clark 1985 och Brady 2004). Investeringar behöver inte ske i fler fartyg utan även i större fartyg eller bättre fiskeutrustning. För att resursränta ska kunna uppstå krävs någon form av förvaltningsåtgärder som begränsar etableringen av för stor fångstkapacitet.

För att begränsa flottans kapacitet finns som diskuterats tidigare ett kapacitetstak för den svenska flottan definierat genom EU:s gemensamma fiskeripolitik. Taket innebär att det inte är möjligt att öka flottans kapacitet mätt som bruttotonnage eller maskinstyrka. För att föra in nytt tonnage i flottan krävs att andra fartyg med motsvarande tonnage tas ur bruk. Flottans faktiska kapacitet att fånga fisk kan emellertid fortfarande öka genom att ny kapacitet har större fångstförmåga än den som förs ut. Det är också möjligt att öka fångstkapaciteten genom nyinvesteringar i

redskap, fler anställda eller andra insatsfaktorer som inte är reglerade. Ett annat förvaltningsinstrument för att kapaciteten inte ska öka är att tillgången till fisket begränsas. Detta sker för svenskt fiske genom ett system med yrkesfiskarlicenser. Eftersom en yrkesfiskarlicens ger ett generellt tillträde till fiske på de svenska kvoterna krävs ingen särskild licens för att få tillgång till kvoter för pelagiskt fiske. Vissa kvoter förvaltas dock annorlunda, och avsätts för enskilda fartyg som har ett traditionellt fiske på beståndet.

För att inte all fisk ska fångas i början av året begränsas fångsterna med hjälp av tvåveckorsransoner. Ransonerna ges till dess att hela kvoten är uppfiskad, och det är inte möjligt att spara sin ranson om den inte utnyttjas. En situation där fisket stängs om kvoten fiskas upp ger incitament att fånga så mycket som möjligt tidigt under säsongen. På samma sätt finns en drivkraft att fiska tidigt under tvåveckorsperioden för att vara säker på att kunna utnyttja hela ransonen. Ransonerna kan emellertid också ha en mildrande effekt på kapacitetsuppbyggnaden genom att det är ransonen och inte fartygets faktiska fångstkapacitet som begränsar uttaget av fisk. Ytterligare en effekt av en ransonering är att den begränsar möjligheten att planera fisket efter hur efterfrågan och landningspriserna ser ut, vilket minskar fiskarens möjligheter att generera högsta möjliga ränta från resursen.

Både kapacitetstaket och yrkesfiskarlicensen är gemensamma för alla segment inom svenskt fiske. Detta innebär att det inom sektorn är möjligt förändra utnyttjandet av befintliga resurser och anpassa detta till existerande fiskemöjligheter. Förvaltningen av fartygskapacitet och tillgänglighet innebär en begränsning av möjligheterna att öka kapaciteten i enskilda fisken, men den flexibilitet som finns inom sektorn ger ändå utrymme för en förflyttning av produktionsfaktorer till lönsamma segment. Detta innebär att ett fiske som genererar resursränta riskerar att locka till sig ökad kapacitet och därmed få lönsamheten urholkad. En kapacitetsökning i form av ökat tonnage inträffade i det pelagiska fisket mellan 1997 och 1998. Tonnaget steg då med cirka 20 procent och har legat kvar på den högre nivån sedan dess. Under andra halvan av 1990-talet skedde som nämnts ovan stora investeringar i det pelagiska segmentet. Även om många investeringar inte direkt avsåg att öka fångstkapaciteten, kan sådana effekter ändå uppstå indirekt. Kapaciteten i det pelagiska fisket är större än vad som krävs för de fiskuttag som är möjliga idag. Waldo (2005) bedömer att det finns en överkapacitet på cirka 30 procent, och Fiskeriverket (2005a, sidan 17) för fram att det finns en ”common opinion that there is technical over-capacity in the segment”. Fiskeriverket pekar också på att den landade volymen per bruttoton har minskat med en tredjedel mellan 1995 och 2002.

Den samlade bedömningen är att förutsättningarna för att det ska finnas en positiv resursränta är små. I segmentet finns en existerande överkapacitet samtidigt som reglerna för skrotningsbidrag inte är gynnsamma för skrotning av fartyg i det pelagiska segmentet (Fiskeriverket 2005b). Även om förvaltningen ändrats på ett antal punkter sedan EU-inträdet har överkapaciteten uppkommit i ett system som i ekonomisk-teoretisk synpunkt är likt det som finns idag. Den rörlighet mellan segmenten som är möjlig i svenskt fiske innebär att om vinster skapas i ett segment kan det komma ett inflöde av kapacitet från andra fisken som urholkar den uppkomna resursräntan. En kapacitetsökning kan också ske genom investeringar i oreglerade produktionsfaktorer för fartyg inom segmentet. De förvaltningsåtgärder som primärt används fungerar som hinder för en ökning av kapaciteten, men skapar inte ekonomiska drivkrafter som verkar för en långsiktigt hållbar utveckling.

4.2. Faktorersättning

I avsnittet redovisas beräkningar av faktorersättningen i det pelagiska fisket. Beräkningarna bygger på de ekonomiska indikatorer som redovisas i EAEF (2005). Posterna ränta och avskrivningar är dock mer detaljerade eftersom den metod som används i EAEF (2005) innebär att dessa blir noll. Beräkningarna av dessa poster bygger i stället på den metod som Fiskeriverket (2005a) använder i sin analys av det pelagiska fisket. I tabell 3 redovisas ett antal ekonomiska indikatorer för segmentet samt faktorersättningen för kapital och arbete. Eftersom fiskeföretagen inte betalar något för tillträdet till resursen, har faktorersättningen för fisken satts till noll.

Tabell 3. Ekonomiska indikatorer (i mSEK) och faktorersättning (% av landningsvärdet)

	2001	2002	2003	Genomsnitt 2001-2003
Ekonomiska indikatorer				
Landningsvärde	563,20	491,70	376,86	477,25
Bränslekostnader	73,20	68,80	85,78	75,93
Andra rörliga kostnader	123,20	88,50	49,28	86,99
Kostnader för fartyget	30,50	88,40	73,91	64,27
Löner	131,30	110,60	83,95	108,62
Avskrivningar	41,70	40,50	39,40	40,53
Ränteutgifter	47,65	48,28	44,47	46,80
Fartygens försäkringsvärde	1330,3801	1308,4336	1375,138	1337,984
Faktorersättning som % av landningsvärdet				
Kapital				
Nettointjäning	60%	50%	45%	51%
Bruttoöverskott	28%	18%	10%	19%
Nettoöverskott	21%	9%	0%	10%
Nettoöverskott + betalda räntor	29%	19%	12%	20%
Arbete	23%	22%	22%	23%
Fiskresursen	0%	0%	0%	0%
Total faktorersättning (A)	52%	42%	34%	43%

Källa: EAEF (2005) och egna beräkningar utifrån EAEF (2005) och Fiskeriverket (2005a)

Landningsvärdet är beräknat som kvantitet enligt loggbok multiplicerat med genomsnittligt pris. Bränslekostnader, andra rörliga kostnader, kostnader för fartyget samt lön beräknas utifrån bokföringen för ett urval av fartygen. I andra rörliga kostnader ingår exempelvis kostnader för försäljning och hantering av fisk. I kostnader för fartyget är reparationer och underhåll den tyngsta posten (EAEF 2005, appendix 23). Ränteutgifterna är beräknade under antagande att 60 procent av fartygens försäkringsvärde är belånade, vilket följer antagandet i Fiskeriverket (2005a). Räntesatsen beräknas som statslåneräntan plus en procent i riskpremie. Statslåneräntan är ett genomsnitt av svenska statsobligationer med en återstående löptid på minst 5 år och är framtagen för att avspegla den riskfria långa marknadsräntan. Avskrivningar är beräknade som 4 procent av försäkringsvärdet för fartyg som är högst 25 år gamla, och som 2 procent av försäkringsvärdet för fartyg som är äldre än 25 år.

Faktorersättningen är ersättning till arbetade timmar och investerat kapital. Ersättningen till arbete är som regel beroende av fångstvärdet genom det lönesystem

som används inom fisket. Lönens andel av landningsvärdet är också i det närmaste konstant över perioden (22-23 procent). Som investerat kapital ingår här både eget och främmande kapital. Nettointjäningen (som motsvarar förädlingsvärdet) är beräknad som landningsvärdet minus driftskostnader i form av bränsle, andra rörliga kostnader och kostnader för fartyget. Nettointjäningen är ett mått på näringens förmåga att betala för användningen av arbete och kapital. Bruttoöverskottet är nettointjäningen minus löner och ränteutgifter. Detta ger ett mått på betalningsförmågan till eget kapital inklusive avskrivningar. Vid nettoöverskottet tas även hänsyn till avskrivningar. Nettoöverskottet ger information om avkastningen på det egna kapitalet efter det att alla omkostnader som finns vid fisket, inklusive slitaget på fartyget, har dragits ifrån. Nettoöverskottet motsvarar företagets vinst och är i genomsnitt 10 procent av landningsvärdet. Nettoöverskottet är beroende av antagandet om andelen eget kapital. Med en belåningsgrad på 100 procent är nettoöverskottet 3 procent av landningsvärdet. Nettoöverskottet på kapital sjunker kraftigt över perioden, från 20 procent 2001 till 0 procent 2003. Den totala faktorersättningen för kapital är beräknat som summan av nettoöverskottet (ersättningen till eget kapital) och ränteutgifter (ersättningen till främmande kapital).

4.2.1. Alternativ avkastning och resursränta

För att fånga fisk till ett värde av 477 miljoner SEK har det under perioden 2001-2003 krävts 344 anställda och fartyg för 1,3 miljarder SEK. En ur samhällsekonomisk synvinkel intressant fråga är om dessa resurser hade kunnat användas bättre på något annat sätt i ekonomin. Den faktorersättning som kan fås genom alternativ användning av resurserna kallas alternativkostnad. Som alternativ avkastning på kapital används en ränta på 6 procent, vilket baseras på realräntan och tillväxttakten i ekonomin. Detta motsvarar den ränta som kapitalet hade genererat i sin alternativa användning. Den alternativa avkastningen på arbete är beräknad som den lön de som arbetar ombord på ett fiskefartyg skulle kunna få om de tog ett annat arbete med motsvarande arbetsuppgifter. Alternativkostnaden för arbete utgår från att 30 procent av arbetskraften på fartyget har större ansvar för fisket och därmed högre lön. Dessa antas ha en alternativlön som motsvarar den en processoperatör inom trä och papper har. De övriga 70 procenten antas ha en lön motsvarande lönen för en ”handpaketerare och andra fabriksarbetare”. Under 2003 hade en processoperatör i genomsnitt 142,4 SEK i timmen, medan en handpaketerare i genomsnitt hade 108,3 SEK (Statistiska Centralbyrån). Tal för alternativ avkastning och resursränta presenteras i tabell 4.

Tabell 4. Alternativ faktorersättning och resursränta som % av fångstvärdet

	2001	2002	2003	Genomsnitt 2001-2003
Alternativ faktorersättning som % av fångstvärdet				
Kapital	14%	16%	22%	17%
Arbete	19%	22%	29%	23%
Total alternativ faktorersättning (B)	34%	38%	50%	41%
Resursränta (A-B)	19%	4%	-16%	2%

Sammantaget kunde arbete och kapital om det använts på andra ställen i ekonomin ha genererat ett värde som motsvarar 41 procent av fångstvärdet. Detta är 2 procent mindre än vad produktionsfaktorerna gjorde i fisket, vilket därmed ger en resursränta på 2 procent. Det finns en tydlig neråtgående trend i resursräntan, och för 2003 är den till och med negativ. Detta innebär att det vid ett *investeringsbeslut* under 2003 skulle ha varit bättre att satsa resurserna på annan produktion än pelagiskt fiske. Detta innebär emellertid inte att det behöver vara företagsekonomiskt lönsamt att sälja existerande fartyg och omplacera kapitalet. Dels kan det finnas förväntningar om ökad lönsamhet, och dels kan det vara svårt att få ut hela det investerade kapitalet vid en försäljning.

Alternativkostnaden för arbete är beräknad utifrån att samtliga registrerade fiskare arbetar heltid. Detta är sannolikt en överdrift. Detta innebär att alternativkostnaden för arbete troligen är något överskattad, vilket leder till en underskattning av resursräntan. Under antagande att den genomsnittliga arbetsgraden är 80 procent kommer resursräntan att vara 7 procent av landningsvärdet. Resursräntan för 2003 är fortfarande negativ (-11 procent). Den kraftiga ökningen av resursräntan i exemplet beror på att alternativkostnaden för arbete är direkt beroende av hur stor arbetstid som används i fisket och hur stor tid som kan läggas på annat arbete. Under antagande att alla är heltidssysselsatta i fisket kommer en anställd att under perioden i genomsnitt att ha haft ungefär samma inkomst i fisket som i ett alternativt arbete. Analysen i fortsättningen kommer att bygga på antagandet att alla är fullt sysselsatta.

4.3. Faktorer som påverkar faktorersättningen

Grunden för fisket är de biologiska resurserna och ersättningen till produktionsfaktorerna kan därför påverkas kraftigt av fluktuationer i beståndsstorleken och hur rekryteringen av nya årsklasser av fisk ser ut. Sverige är en liten aktör på den

internationella marknaden, så fluktuationer i utbud och efterfrågan internationellt kan också ha stor påverkan på de landningspriser svenska fiskare får. Nedan diskuteras hur beståndsutnyttjandet och prisbilden var under den studerade perioden 2001-2003 jämfört med perioden före, och hur detta förväntas ha påverkat den beräknade resursräntan.

4.3.1. Beståndssituationen

Beståndssituationen är generellt svår att bedöma för segmentet eftersom fartygen är mycket flexibla i sina fiskemönster och fiskar i olika hav och på olika bestånd. Fångsternas sammansättning har också ändrats under perioden, exempelvis har blåvitling tillkommit som en ny art. Nedan diskuteras beståndssituationen för de olika arterna och en bedömning görs hur beståndsutnyttjandet ser ut och om de årsklasser som fisket bedrivs på är större eller mindre än tidigare årsklasser. Pelagiska arter har ofta en hög naturlig variation i bestånden, vilket gör att de biologiska förutsättningarna kan variera snabbt.

Ett bestånd klassificeras som antingen underutnyttjat, fullt utnyttjat, överutnyttjat eller nedfiskat. Utgångspunkten i bedömningen är de rapporter som årligen publiceras av internationella havsforsningsrådet (ICES). ICES gör dels en bedömning om lekbiomassan är så pass stor att rekryteringen till beståndet inte är hotad, och dels en bedömning om fiskdödligheten är hållbar på så sätt att en fortsatt fiskdödlighet på samma nivå inte kommer att leda till ett nedfiskat bestånd. Bedömningen för det pelagiska segmentet bygger på ICES (2004) om inget annat årtal anges.

En bedömning av nyrekryteringen av ungfisk görs för att se om de årsklasser på vilka fiske bedrivs är större eller mindre än tidigare årsklasser. De viktigaste årsklasserna är beroende av vilket område fiske sker i (och vilken typ av fiske som bedrivs) och kan därför variera även inom enskilda arter. En förenklad klassificering har gjorts som innebär att fiske efter sill, skarpsill och blåvitling antas ske på fiskar som är mellan ett och fem år gamla. Fiske sker inte på makrill det första året, utan antagandet är att fisket bedrivs på makrill som är mellan två och sex år. Tobis är en kortlivad fisk där fisket till stor del är beroende av de senaste årsklasserna. Tobis fiskas då de är mellan noll och två år gamla. Klassificeringen bygger på rapporterade fångster i olika åldersklasser som sammanställts av ICES (Advisory Committee on Fishery Management (ACFM)). De rapporterade siffrorna är den procentuella skillnaden mellan ett genomsnitt för rekryteringen för de årsklasser som ingick i fisket under 1998-2000 och de som ingick 2001-2003.

Inom segmentet fångas *sill* både i Östersjön och i resterande havsområden. Cirka hälften av den svenska kvoten är för Östersjösill, medan den andra hälften är fördelad mellan övriga områden men med tonvikten på Kattegatt/Skagerrak. Beståndssituationen är olika för de olika bestånden. Östersjösillen bedöms som överutnyttjad, medan sillen i västerhavet bedöms som fullt utnyttjad. Även rekryteringen ser olika ut med en minskning med cirka 4 procent för östersjösillen och en ökning med över 8 procent för övriga bestånd (här ingår både vårlekande och höstlekande sill).

I ICES råd för 2004 bedöms *makrill*bestånden vara nedfiskade och fångsterna större än vad som är biologiskt hållbart. Rekryteringen har minskat med cirka 13 procent mellan perioderna 1998-2000 och 2001-2003.

Skarpsill fångas nästan uteslutande i Östersjön och i Kattegatt/Skagerrak. Bedömningen nedan baseras på beståndet i Östersjön eftersom den biologiska rådgivningen för Kattegatt/Skagerrak inte innehåller nödvändiga uppgifter. Östersjöfisket omfattar cirka 80 procent av den svenska kvoten. ICES gör bedömningen att lekbeståndet har full reproduktionskapacitet och att fisket bedrivs hållbart. I rådgivningen för 2003 rekommenderar ICES dock att fiskdödligheten inte bör öka. Detta tillsammans med att beståndet är historiskt sett mycket högt ger en bedömning att skarpsillen är fullt utnyttjat eller något underutnyttjad. Rekryteringen till beståndet sjönk emellertid med cirka 22% mellan perioderna 1998-2000 och 2001-2003.

Beståndet av *tobis* bedöms av ICES vara nedfiskat år 2004 och 2005, men inga säkra uppgifter fanns för år 2003. Bedömningen är därför att beståndet under 2001-2003 var överutnyttjat. Beståndsrekryteringen minskade med nära 40 procent mellan de två jämförelseperioderna. Tobisen har också en mindre andel av fångstvärdet 2003 jämfört med 2001.

Blåvitlingen rör sig över stora områden under sin livstid och allt fiske bedöms ske på samma bestånd (ICES 2005). ICES bedömer att blåvitlingen har full reproduktionskapacitet men att fångsterna är större än vad beståndet tål. Beståndet bedöms därför vara överutnyttjat. ICES uttrycker farhågor över det stora uttaget under senare år, men konstaterar samtidigt att reproduktionen varit mycket hög. Rekryteringen har ökat med över 60 procent mellan de två jämförelseperioderna. Noterbart är dock att blåvitling hade mycket liten betydelse för det pelagiska segmentet under perioden 1998 till 2000.

4.3.2. Prispremie

Landningspriset på de pelagiska arterna har generellt stigit mellan perioderna 1998-2000 och 2001-2003. Beräkningen av prisskillnaden mellan perioderna är gjord utifrån uppgifter om landad vikt och landningsvärde från EAEF (2005). Det genomsnittliga priset för varje år är beräknat som totalt värde av all landad fisk dividerat med totala landningar. Medelvärdet för respektive period har beräknats med landad volym för de respektive åren som vikt. Priserna under perioden 2001-2003 var 39 procent högre än under perioden 1998-2000. Den höga prispremien beror framför allt på mycket höga landningspriser under 2001, men en del kan också härledas till förändrat penningvärde. Prispremien var 32 procent i fasta priser.

4.3.3. Sammanfattande bedömning

Bedömningen av hur biologiska faktorer och prisfluktuationer påverkat resursräntan utgår dels från en sammanställning av den biologiska statusen för de bestånd fisket bedrivs på, och dels på en analys av hur prisfluktuationer har påverkat resursräntan under den studerade perioden.

Beståndssituationen sammanfattas i tabell 5. De presenterade andelarna av bestånden som är under, fullt, över, respektive nedfiskade bygger på bedömningen i texten ovan. Eftersom arterna är olika viktiga för segmentets ekonomi har beståndsinformationen vägts samman med respektive arts genomsnittliga andel av landningsvärdet under perioden 2001-2003. På samma sätt har förändringen i nyrekrytering viktats med varje arts andel av landningsvärdet under perioden. Utvecklingen för sillen är olika för Östersjön och övriga havsområden. Eftersom ungefär hälften av sillen kommer från Östersjön och hälften från andra hav så har rekryteringen i Östersjön och övriga hav getts lika vikt.

Tabell 5. Faktorer som påverkar faktorersättningen

Berståndsutnyttjande %	
Under	0
Fullt	48 %
Över	44 %
Nedfiskat	8 %
Totalt	100 %
Rekrytering (förändring i % mellan perioderna 2001-2003 och 1998-2000)	-5 %
Prispremie (förändring i % mellan perioderna 2001-2003 och 1998-2000)	+39 %

Sammantaget visar den biologiska genomgången på bestånd som är väl utnyttjade med små möjligheter till att öka fisket inom de arter där fiske bedrevs under den studerade perioden. Den viktade rekryteringen visar att de årgångar som fisket bedrivs på är något mindre under den aktuella perioden jämfört med perioden före. Kvoterna har också generellt minskat kraftigt, 25 procent under perioden 1995-2002.

För en given kvalitet på fisken bedöms företagen i det pelagiska segmentet inte kunna påverka landningspriserna då den svenska kvantiteten endast utgör en liten del av de totala kvantiteter som handlas med på den internationella marknaden. Världsmarknadspriset för de pelagiska arterna har varierat kraftigt (FOI 2005), vilket avspeglas i de svenska landningspriserna. Exempelvis ökade det viktiga sillpriset med cirka 100 procent mellan 2000 och 2001.

För det svenska pelagiska fisket har priserna på den landade fisken stigit mycket kraftigt mellan perioderna 1998-2000 och 2001-2003. Det höga prisläget kompenserar för nedgången i fångad volym som sker mellan perioderna så att landningsvärdet (i fasta priser) i genomsnitt är något större under 2001-2003 än under 1998-2000. En bidragande orsak till de högre priserna kan vara de investeringar som gjorts i förbättrade kyltankar. Före 1995 fanns cirka 20 fartyg med kyltank, men mellan 1995 och 2002 hade ytterligare 40 fartyg investerat i detta (Fiskeriverket 2005a).[12] En del av prisökningen kan således bero på ökad kvalitet på den landade fisken.

Den sammanlagda bedömningen är att priserna har mycket stor betydelse för segmentets ekonomi. Detta förs också fram av Fiskeriverket (2005a). Priserna har i genomsnitt sjunkit med ca 30 procent mellan 2001 och 2003, vilket sammanfaller med att fiskets vinster har sjunkit mycket kraftigt under den studerade perioden. Den resursränta som skapats bedöms därför i stor utsträckning bero på höga världsmarknadspriser i början av perioden.

4.4. Möjligheter att öka resursräntan genom förändringar i förvaltningen

Det sätt på vilket det pelagiska segmentet har förvaltats har inneburit att det uppstått överkapacitet och dålig lönsamhet. Näringen har därför i samarbete med Fiskeriverket initierat ett förslag till ett förvaltningssystem med fartygsspecifika försäljbara fångstkvoter. Förslaget gäller för allt pelagiskt fiske, dvs. även för fartyg under 24 meter. Systemet innebär att varje fartyg tilldelas en andel av den svenska kvoten.

[12] Observera att vissa av dessa fartyg kan ha skrotats eller lämnat det pelagiska fisket för annat fiske.

Denna andel kan sedan fiskas när det är ekonomiskt mest lönsamt utan att det finns risk för att kvoten blir uppfiskad. Detta ger fiskaren möjlighet att pressa kostnaderna och bedriva fiske på ett sätt som ger höga landningspriser. Fiskare som vill utöka verksamheten kan köpa kvot och fiskare som vill sluta eller dra ner på verksamheten kan sälja kvot. Försäljning av kvoter utgör en möjlighet för fiskare som vill lämna fisket att täcka eventuella lån på fartyget som inte en försäljning av fartyget täcker.

Ett system med försäljbara fångstkvoter är enligt ekonomisk teori fördelaktigt för skapandet av resursränta (FAO 2000). Genom att införa ett marknadsbaserat instrument i fiskeriförvaltningen kommer näringen själv att kunna fördela fisket, både över tiden och mellan fartyg, på ett sätt som gynnar den ekonomiska lönsamheten. Det pelagiska fisket har ett antal egenskaper som skapar goda förutsättningar för en marknadsbaserad förvaltning. Exempel på detta är att fisket bedrivs med små bifångster av annan fisk och att fisket är lätt att avgränsa från andra fisken (Fiskeriverket 2005b).

Om tidigare förvaltning har inneburit att fiskets struktur är mycket olik den som är ekonomiskt mest fördelaktig, kan införandet av försäljbara kvoter innebära en kraftig omstrukturering av flottan. En sådan omstrukturering kan påverka andra fiskeripolitiska mål än de rent ekonomiska. I svensk fiskeripolitik poängteras vikten av kustnära fiske och hur flottans geografiska fördelning ser ut (Regeringens proposition 2003/04:51). Försäljbara kvoter kan motverka dessa mål om en omstrukturering av flottan följer tidigare trender mot större fartyg[13] och en geografisk koncentration till den svenska västkusten. För att styra marknaden kan regleringar införas som låser en viss andel av kvoten till småskaligt fiske eller till prioriterade geografiska områden. Begränsningar i handeln med kvoter främjar dessa målsättningar, men innebär också kostnader i form av lägre resursränta då det inte är möjligt för näringen att organisera fisket på det sätt som är företagsekonomiskt bäst.

[13] Waldo (2005) visar att större fartyg är effektivare producenter, vilket tyder på att det finns stordriftsfördelar.

5. Fördelning av faktorersättningen mellan näring och samhälle

Staten bestämmer genom skattesystemet hur de ekonomiska värden som skapas i en näring ska fördelas mellan samhällets individer. Fiske bedrivs på en gemensam resurs och ett väl förvaltat fiske kan generera en hög resursränta. Staten kan fördela resursräntan med hjälp av skatter på löner och företagsvinster, men också genom en direkt resursbeskattning eller olika typer av avgifter för nyttjanderätten till resursen. Nedan beskrivs det svenska skattesystemet och hur faktorersättningen fördelas mellan näring och samhälle i den svenska fiskenäringen.

5.1. Beskattning av fiskeverksamhet

De flesta företag inom det pelagiska segmentet är aktiebolag, och därför beskrivs skattesystemet utifrån de regler som gäller för aktiebolag. Fisket kan emellertid också bedrivas i form av handelsbolag eller enskild näringsverksamhet, vilka har delvis annorlunda skatteregler. Generellt karaktäriseras det svenska skattesystemet av att skatt främst tas ut på inkomst av arbete och kapital, samt privat förmögenhet. Företag betalar skatt på vinsterna, men inte på förmögenhet. Detta innebär bland annat att intäkter som återinvesteras i företaget inte beskattas, men vinster som tas ut ur företaget gör.

Aktiebolag beskattas med 28 procent på företagets vinst. Hela eller delar av den beskattningsbara vinsten kan läggas i en periodiseringsfond för att skjuta skatteutbetalningar på framtiden, dock maximalt 6 år (Skatteverket 2005). Vinster som återförs till beskattning från periodiseringsfonden ingår i det aktuella årets resultat. Detta ger en möjlighet att jämna ut den beskattningsbara vinsten för företag som har kraftigt varierande vinster olika år. Uppstår exempelvis en förlust är det möjligt att återföra en del av periodiseringsfonden till beskattning, och den del som täcker årets förlust kommer då inte att beskattas (Skatteverket, skatteupplysningen muntligt).

Alla anställda i ett aktiebolag får ut sin ersättning i form av lön. Dessa beskattas både direkt och indirekt. Båda skatterna utgår från bruttolönen (Skatteverket, skatteupplysningen muntligt). Arbetsgivaravgiften (indirekt skatt) är 32,28 procent. Den direkta skatten beror på kommun och om inkomstnivån är så hög att statlig skatt tillkommer. Då inkomsterna från fisket förväntas ligga under brytpunkten för skatlig skatt är utgångspunkten att endast kommunalskatt betalas. Under 2001-2003 var den

genomsnittliga kommunala skattesatsen för samtliga svenska kommuner 30,74 procent (SCB, medelskattesatser 1930-2006).

Fiskresursen beskattas inte i det svenska skattesystemet.

5.2. Fördelning mellan näring och samhälle

Fördelningen av faktorersättningen mellan näringen och samhället är beräknat utifrån det skattesystem som diskuterats ovan. Basen för beskattningen av arbetskraften är uppgifterna om lön från EAEF (2005). Då de individuella lönerna förväntas ligga under brytpunkten för statlig beskattning beräknas skatterna för arbete som en andel av angiven total lön i segmentet. Kapitalbeskattningen beräknas som 28 procent på den beräknade vinsten i företaget, och som 30 procent på ränteutgifterna eftersom detta är skattesatsen för kapitalinkomster. Eftersom det är möjligt att periodisera vinsterna beräknas bolagsskatten på den genomsnittliga vinsten under 2001-2003. I tabell 6 redovisas hur stor ersättningen (som andel av landningsvärdet) till kapital, arbete och myndigheter (skatt) är i det pelagiska fisket jämfört med i alternativ användning. Det redovisade talet för exempelvis kapital ska därför tolkas som hur mycket mer/mindre ersättning som utgått till kapital (efter skatt) i fisket jämfört med hur mycket som hade utgått om kapitalet investerats i något annat. Den sammanlagda skillnaden mellan fiske och alternativ användning för de tre posterna summerar till resursräntan.

Tabell 6. Fördelning av resursräntan

	% av landningsvärde Genomsnitt 2001-2003
Nettoersättning kapital	1,6%
Nettoersättning arbete	-0,3%
Skatt	0,7%
Totalt	2,0%

Sett över perioden fick kapital som investerats i fisket högre ersättning än kapital som investerats i andra sektorer (skillnaden motsvarar 1,6 procent av landningsvärdet). Detta beror framför allt på en hög ersättning till kapital under 2001. Ersättningen till arbete var mindre i fisket än i alternativa arbeten, vilket beror på en låg ersättning under 2003. Skatteintäkterna var större från fisket än om resurserna satsats i andra

sektorer sett över hela perioden, men mindre under 2003. Utvecklingen för samtliga poster följer segmentets neråtgående trend över perioden.

För att fisket ska vara samhällsekonomiskt lönsamt krävs att resursräntan även täcker de kostnader samhället har för kontroll etc. av fisket. Nedan diskuteras subventioner till fisket och hur stora dessa är i förhållande till den resursränta som genereras i fisket.

5.3. Subventioner

I OECD (2005) beräknas stödet till fisket i OECD:s medlemsländer under perioden 2001-2003. Enligt OECD (2003) består cirka 70 procent av de svenska subventionerna av ”general services”, dvs. forskning, förvaltning, kontroll och infrastruktur. En del av stödet har tidigare gått till investeringar, något som har påverkat strukturen på dagens pelagiska flotta. Fiskeriverket (2005a) har analyserat hur stor påverkan på lönsamheten som investeringsbidragen till det pelagiska segmentet har inneburit. Stödet innebar en reduktion av kostnaden för modernisering med 36 procent och en reduktion av kostnaden för nybygge med 12 procent mellan 1995 och 1999. Effekten beräknas vara en ökning av nettovinsten från 10 procent av landningsvärdet till 11 procent av landningsvärdet.

Det svenska fisket har enligt OECD (2005) fått följande belopp (akvakultur ingår ej):

Tabell 7. Statliga överföringar exklusive överföringar till akvakultur i m SEK

	Subvention
2001	218,6
2002	238,4
2003	266,3
Genomsnitt	241,1

Källa: Beräknat från OECD (2005)

Dessa uppgifter ingår som underlag till beräkningarna hur faktorersättningen fördelas mellan samhälle och näring. De statliga överföringarna inkluderar stöd som endast indirekt kommer fiskarna till del, exempelvis stöd till förbättring av hamnar. Detta innebär att de statliga överföringarna till fisket kan vara något övervärderade.

Det pelagiska segmentet antas ta del av subventionerna i proportion till segmentets andel av landningsvärdet, vilken i genomsnitt är 45,7 procent. Detta motsvarar en genomsnittlig subvention på 110 miljoner SEK. Det pelagiska segmentet har ett högt

fångstvärde men relativt få fartyg vilket kan innebära att vissa kostnader, exempelvis kontrollkostnaderna, för segmentet inte motsvarar segmentets andel av landningsvärdet.

I tabell 8 visas resursräntan då subventioner till det pelagiska fisket ingår i beräkningen.

Tabell 8. Resursränta och subventioner

	% av landningsvärde Genomsnitt 2001-2003
Resursränta	2%
Subventioner till pelagiskt fiske	24%
Total resursränta inklusive subventioner (faktorersättning – alternativkostnad – subventioner)	-22%

Subventionerna motsvarar i genomsnitt 24 procent av landningsvärdet. Då värdet av subventionerna dras ifrån den resursränta som skapas inom segmentet kommer den justerade resursräntan att vara negativ, -22 procent. Även om segmentets andel av subventionerna endast skulle vara hälften av de antagna kommer resursräntan att vara negativ.

En stor del av subventionerna består av verksamhet som inte direkt påverkar kostnaderna i företaget, exempelvis kontroll och administration. Företagen kommer därför att agera som om dessa kostnader inte existerade och maximera sin vinst utifrån den kostnadsstruktur de möter. Eftersom de teoretiska förutsättningarna för skapande av resursränta är små, kommer segmentet att utvecklas mot överkapacitet och dålig lönsamhet även utan att räkna in de extra kostnader som kontroll etc. utgör. Då hänsyn tas till dessa kostnader blir resursräntan negativ.

6. Avslutning

Resursräntan från det storskaliga pelagiska fisket var i genomsnitt 2 procent av landningsvärdet under perioden 2001-2003 (subventioner ej inräknade). Den resursränta som skapats beror till stor del på de höga landningspriser som rådde under 2001. Prisnivån under 2001 bidrog till att priserna under den studerade perioden 2001-2003 i genomsnitt var 39 procent högre än under tidigare treårsperiod. Under 2002 och 2003 sjönk emellertid priserna åter och år 2003 var de i nivå med åren före den studerade perioden. De sjunkande priserna återspeglas i att resursräntan minskade kraftigt mellan 2001 och 2003, för att under 2003 till och med vara negativ.

Förutom de resurser som näringen använder i fisket har samhället kostnader för administration, kontroll, biologisk rådgivning m.m. Tas hänsyn till dessa blir resursräntan kraftigt negativ. Denna beräkning kan dock innebära en underskattning av resursräntan eftersom det i kostnaderna ingår kostnader för forskning och infrastruktur, och att en näring tar del av exempelvis statsfinansierad forskning är inte specifikt för fisket.

En förklaring till den låga resursräntan är att det finns en betydande överkapacitet i segmentet, vilket driver upp kostnaderna och ner lönsamheten. Den ekonomiska press som karaktäriserar fisket idag visar sig i analysen framför allt under år 2003 då resursräntan är negativ. Överkapacitet och dålig lönsamhet har lett till att förvaltning med försäljbara fångstkvoter diskuteras som ett alternativ till dagens system med fångstransoner. Det föreslagna förvaltningssystemet har de teoretiska förutsättningarna att minska kapaciteten och skapa en bestående resursränta utifrån de förutsättningar i form av fångstkvoter och landningspriser som finns inom fisket.

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THE DANISH MUSSEL FISHERY

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1. Introduction

In this case study report, the economic performance of the Danish mussel fishery will be analysed. The focus is on the economic return of society, which is measured by the resource rent. This is defined as "*the return which is left to the remuneration of capital and labour above the level in other businesses*". The resource rent is calculated *before* and *after* the deduction of net public expenses to the fishery such as subsidies and fisheries management costs. The size of the resource rent is identified, and it is assessed whether and if so, how it potentially can be increased. Our main focus is on the present licence regulated-management system, limiting vessels into the fishery. Furthermore, the present allocation of the resource rent between capital, labour and the public authorities is identified. Also, it is assessed how and within which limitations the public authorities can increase their share of the resource rent. Calculations are performed on the basis of detailed statistics from the period 2001-2003.

The subject is important because the Danish mussel fishery showed a very good economic performance for several years. In this regard, it would be interesting to analyze how good the economy of the fishery is. In our report, the size of the resource rent produced by the Danish mussel fishery is identified, and it is explained why the management system works as it does.

The allocation of resource rent is interesting, since the public authorities - according to the Fishery Law - own fish resources without necessarily obtaining a significant share of it. Hence, there might be a potential for increasing the public share of the resource rent from the 2001-2003 situation, where biological factors affected the catch potential in a positive way. The allocation of the resource rent is affected by the general tax system, as well as by net public expenses to the fishery, and it is identified in the present paper. Opportunities and limitations for re-allocation from capital and labour to the public sector are also analyzed.

Section 2 provides a summary of the Danish mussel fishery including common and specific regulations. Section 3 identifies the size of the resource rent in the fishery and argues how it can be expanded to reap greater benefits in the future. Section 4 assesses how the resource rent is allocated between capital, labour and the public sector *after* the deduction of net public expenses to the fishery. An assessment of the resource rent re-allocation from capital and labour to society as a whole is provided in the same section. This can be done in several ways, e.g. by phasing out subsidies to

the fisheries sector, by collecting fees on fisheries management costs or by introducing tax on landings. Concluding remarks are provided in Section 5.

It should be pointed out that the results obtained are based on various assumptions. Thus the results are subject to uncertainty and should, by implication, be interpreted with caution.

2. The Danish Mussel Fishery

In Demark, approximately 17,500 people are employed in the fisheries sector (i.e. fishery, processing, aquaculture and sales). Furthermore, a significant number are employed in industries related to the activities of the fisheries sector. Though the overall contribution of the fisheries sector to the Danish economy is relatively minor, less than 0.5 percent of Gross Domestic Product (GDP), it constitutes a very important economic activity in specific regions of Western and Northern Jutland and on the island of Bornholm.

There are basically three main types of fisheries in Denmark: (i) the demersal fishery; (ii) the pelagic fishery; and (iii) the industrial fishery. The major part of the production is exported. According to the Yearbook for Fishery Statistics (2005), the European Union (EU) is the most important market for Danish fishery products; in 2004, 79.8 percent of total exports went to other EU member countries, corresponding to a total value of DKK 13.2 billion. The value of Danish exports of fish and fishery products to the whole world was DKK 16.5 billion in 2004, while imports, which are dominated by unprocessed fish, amounted to DKK 10 billion worth of landing value.

The general framework for Danish fisheries management is the Common Fisheries Policy (CFP) of the European Commission (EC). The CFP contains the legal basis for all fisheries in community waters. The principle of relative stability specifies the allocation of total allowable catches between member states. The CFP also includes general rules on technical conservation measures, fisheries control, market arrangements and structural policy. The Danish fishery is also subject to capacity regulations, as specified in the legal notices issued by the Danish Ministry of Food, Agriculture and Fisheries (MFAF) and the European Commission (EC)[14]. The aim of these regulations

[14] Legal notice of the Danish Ministry of Food, Agriculture and Fisheries (MFAF) no. 124 of 27/02/2004 and the European Commission (EC) regulation no. 1438/2003, OJ L 204 of 13/08/2003.

is at EU level to limit capacity in accordance with available fish stocks and to secure reasonable incomes for the sector.

For the largest fjord in Denmark – the Limfjord – a fishery management plan is in force with the aim of restoring fish stocks and versatile fish life in the fjord. The plan is the result of a joint working project between the Ministry of Agriculture, Food and Fisheries, the Ministry of the Environment and the relevant regional authorities. A main consequence of the plan is to place further restrictions on mussel dredging in the Fjord through a reduction of the area where mussel fishery is allowed, and by gradually decreasing the size of the fleet of mussel dredgers as fishers leave the business (OECD, 2005).

The mussel fishery in Denmark is a single species, single fleet fishery for blue mussels (*mytilus edulis*), supplemented by smaller catches of oysters (*ostrea edulis*), and cockles (*conchyllium*). The fishing vessels are small and all use dredges. The fishery takes place close to the shore or in inlets. The fishery is carried out as a one-day fishery. According to the Ministry of Agriculture, Food and Fisheries (2003), the total annual landings of mussels in Danish harbours were between 86,000 and 122,500 metric tonnes in the last ten years with a total annual landing value of DKK 55 million to DKK 146 million. More than 90 percent of the landings are exported as frozen and canned. Denmark is one of the most important producers of canned mussels in Europe, and the only fishing nation relying fully on captive mussels. The Danish mussel fishery is carried out in the Limfjord, Kattegat/Small Belt, and the Wadden Sea.

The Mussel fishery is managed on exclusive entry licenses including clear specifications of the capacity of the vessels. Catch limits per vessel per time period are applied, for instance to avoid that the quality of mussels falls when waters get warmer. In the Wadden Sea the fishery is managed in a tri-national agreement; whereas the fisheries in the Limfjord and Kattegat/Small Belt areas are managed at a national level. The different areas have various regulations on engine power, length overall and the number of dredges to be used in the fishery. The daily and weekly landings are limited depending on the fishing area. Management of the Danish mussel fishery is very effective economically, and the turnover generated has been very high for many years.

A summary of the situation of the Danish mussel fishery during 2001-2003 is given in Table 1 below.

Table 1. Statistics of the Danish Mussel Fishery, 2001-2003 period

	2001	2002	2003	Average
Number of Full-time Mussel Fishermen (Estimated)	74	76	73	75
Fishing Vessels:				
Number of Mussel Vessels	62	62	64	63
Average Tonnage (GT/GRT)	21	20	20	20
Average Engine Power (kilowatt)	133	129	127	129
Average Insurance Value (DKK million)	2	2	2	2
Landing Value of Mussels (DKK million)	153	142	104	133
Share of Total Landing Value (%)[1]	5	5	3	4
Landing Quantity of Mussels (1,000 tonnes)	125	113	94	111

Source: Yearbook for Fishery Statistics for 2001-2003 period issued by the Directorate of Fisheries of the Danish Ministry for Food, Agriculture and Fisheries, Copenhagen, Denmark.
Notes:
[1] Total average landing value of all species by all Danish vessels amounted to DKK 3,107 million during the 2001-2003 period.

There were 75 registered full-time mussel fishermen on 63 fishing vessels, bearing an insurance value of DKK 2 million on average. The average tonnage of mussel vessels amounted to 20 GT/GRT and the average engine power recorded 129 kilowatts. The landing value of mussels and other-related species like oysters and cockles averaged DKK 133 million, with a corresponding landing quantity of 111,000 tonnes. The decrease in landing value from DKK 153 million in 2001 to DKK 104 million in 2003 can be explained by falling catches due to the increasing deoxygenation problem in the major fishing areas (Kristensen and Hoffmann, 2004). Overall, mussels accounted for 4 percent of the total landing value of all species caught by Danish fishermen from 2001 to 2003.

In 2003, an advisory shellfish board under the Ministry of Food, Agriculture and Fisheries called for blue mussel farming in Danish waters. Based on interim recommendations from the board, certain areas of the Limfjord were assigned to shellfish production, and licensing began in early 2004 in the administration and development of the industry.

According to the Institute of Food and Resource Economics (2004), the largest area in terms of mussel landings is the Limfjord, followed by the Kattegat/Small Belt, and the Wadden Sea. Hence, mussel fishermen and farmers share the management of the Limfjord today. These three primary areas in which mussel fishery takes place are

generally managed in the same way, although there are differences in detail. An outline of the most important management tools of the Danish mussel fishery is shown in Table 2.

Table 2. Management Tools of the Danish Mussel Fishery

	Area		
	The Limfjord	Kattegat/Small Belt	Wadden Sea
Production Limits:			
Level of Landings incl. Shell (tonnes)	80,000	20,000	5,000
Week Quota per Vessel (tonnes)	85	270	75
Day Quota per Vessel (tonnes)	30	.	40
Effort Restrictions:			
No. of Permits (licenses)	51	6	5
Maximum Engine Power (hp (kW))	175(129)	300(221)	300(221)
Maximum Vessel Size (GRT(GT))	8(12)	.	.

Source: Kristensen and Hoffmann (2000).
Notes: [1] ICES area 22A.
[2] Including mud and sand brought on board.

The main management instruments used are vessel entry restrictions, capacity limitations (expressed in terms of engine power, length, breath, draught, and tonnage), and individual quotas. Also, it is prohibited to fish on Sundays. The total number of licenses is restricted to 62 and there are restrictions on engine power. Further constraints are imposed on vessel size in terms of tonnage for the Limfjord area. In agreement with the fishermen, weekly and daily quotas per vessel are set by the Directorate of Fisheries. The quotas are fixed in gross terms; i.e., mussels with shell including mud, sand and other items caught. A minimum size of mussels is set as well. Although stock estimates are carried out, they serve as indicators for the sustainability of the stocks and not for the determination of quotas. There is a strong element of co-management; i.e., direct involvement of the fishermen in the management of the fishery. Formerly, the weekly quota in the Limfjord was set at 110 tonnes per vessel, but the fishermen claimed that a lower rate was needed, which was then approved by the Danish Ministry of Food, Agriculture, and Fisheries.

The fishery takes place for a limited number of weeks every year, and the fishermen themselves agree on closures. These occur in the wintertime when the meat content of mussels is low, and in the summer period when there are risks of algae blooming and, thereby, food poisoning from eating mussels. In the Limfjord, the fishery is conducted for less than 30 weeks a year, while in the other areas it is often stopped throughout the months of June, July and August. It should be noted that certain areas within the main fishing grounds are closed for the fishery. The reason for this is because these

areas serve as nursery grounds, bird sanctuaries or shipping routes for commercial vessels and leisure boats. The Ministry of Food, Agriculture, and Fisheries in cooperation with the Ministry of Environment, and the Ministry of Transport are responsible for selecting these closed areas.

The Directorate of Fisheries of the Ministry of Food, Agriculture and Fisheries holds the general responsibility for the management of the Danish mussel fishery. This implies issuing licenses and laying down the legal conditions for the execution of the fishery including rules for the vessels. Another institution, the Danish Veterinarian and Food Administration, is responsible for the monitoring of quality and food safety of the mussels and hence time closures. The Danish Environmental Protection Agency, under the Ministry of the Environment, is responsible for protecting the marine environment in inlets and close to the shore, which has an impact on the fishery.

The Danish Institute for Fisheries Research carries out biological research with respect to assessments of the stocks and other types of biological information and the Institute of Food and Resource Economics collects account statistics. In particular, the fishermen's role in the Danish mussel fishery as co-managers should be emphasized. Because of limited entry, the number of agents in the fishery is relatively small in the different areas and, hence, cooperation among fishermen is easier to establish than in any other larger fishery. Furthermore, these elements must be taken into consideration for the economic success of the management system. No Total Allowable Catch (TAC) is set for the mussel fishery. The capacity restrictions are sufficient to restrict effort to a level ensuring a biomass above critical biological limits and good economic viability. The fishermen themselves decide the number of fishing days, during which the season is determined by the daily and weekly quotas, and the fishermen choose when the season will start and when it ends. Therefore, the fishery is in its essence an effort-restricted fishery.

The catches at around 100,000 tonnes a year are much lower than the estimated annual stock production, estimated at 0.5 times the biomass (Munch-Petersen and Kristensen, 2001), even though the biomass assessments show a decrease in abundance over the last ten years. This could be explained by several factors, but fishing does not seem to be the most important one. Deoxygenation, as an environmental influencing factor, is regarded as the most important reason (Kristensen and Hoffmann, 2004), and seems to be an increasing problem. This phenomenon is to some extent beyond the control of the authorities in the short and medium term. Therefore, it could be argued that current catches and fishing mortality, which are controlled by the public au-

thorities, are too high in combination with the natural mortality caused by predation from birds and deoxygenation.

3. Size of the Resource Rent

3.1. Size of the Resource Rent in 2001-2003

The economic rent for the existence of a fishery for society can be measured by the resource rent, which shows *"the return left to the remuneration of capital and labour corresponding to the level in other businesses"*. Theoretically, the resource rent is the difference between total revenues obtained from the fishery resource, and total costs of production with capital and labour valued at their opportunity costs. The resource rent can have either a positive or negative value. A positive resource rent gives a larger remuneration of capital and labour in the fishery than in other sectors, whereas a negative resource rent indicates that there is lower remuneration of capital and labour than in other businesses.

The opportunity cost concept refers to what fishermen could be earning if they were employed in a sector other than the pair trawling industry. The resource rent will be positive if the fishery produces higher remuneration of labour and capital than in other sectors. The factor remuneration that the fishery generates above other industries can be seen as a profit of the fish resource.

Fishery management has a significant impact on the possibility of creating resource rents (OECD 1997 and FAO 2000). If its potential is not well understood and there are no limits on fishing effort, this wealth will not be realised. Hence, potential resource rents can be wasted on excess capacity, leading to the depletion of fisheries resources. According to fisheries economic theory, open access would yield no economic rent, whereas a sole owner would maximize economic rent.

In our paper, the resource rent is calculated as follows: the turnover minus costs (excluding labour and capital), labour costs in alternative use, and capital costs in alternative use. The resource rent is calculated both *before* the deduction of net public expenses to the fishery (type A), as well as *after* the deduction of these net expenses in other businesses (type B). Net public expenses are made up of subsidies and fisheries

management costs. Both turnover and costs are known from the account statistics of the Faroese public authorities.

The remuneration of labour in actual use equals the crew share plus owner's wage (opportunity cost). The crew share is known from the Account Statistics for Fishery published by the Institute of Food and Resource Economics (2001; 2002; 2003) and it includes wages, social expenses and payments to employees.

Remuneration of capital in actual use is obtained by subtracting fuel costs, other running costs, vessel costs, crew share and depreciation from the sum of the value of landings and other incomes. Vessel costs include maintenance, vessel, hull, engines and winches, electronic equipment, fishing gear, landward assets, insurance on vessel, gear, etc., insurance on landward assets, administration costs, and other services.

Labour costs in alternative use indicate what level of salary Danish mussel workers can obtain, provided they find employment in other sectors. In this paper, the average annual salary is calculated for both fishermen and captain assuming that 30 percent of labour costs are for skilled workers (i.e. captains) and the remaining 70 percent for low paid unskilled employees (i.e. fishermen).

Average remuneration of labour in alternative use is equal to the sum between 70 percent of the average yearly wage of unskilled mussel fishermen (e.g. crew members) with a basic Danish lower secondary school qualification (DKK 329,000) and 30 percent of the average yearly wage of skilled mussel fishermen (e.g. captains) with a short more advanced studies qualification (DKK 439,000). Both values are multiplied by the average number of full-time mussel fishermen (75).

In the present report, remuneration of capital in alternative use is calculated as a share of the vessel's insurance value, which gives values of fishing vessels including hull, engine, tools, etc. excluding possible fishing rights. Values of fishing rights are not included in the calculation of the resource rent. Remuneration of capital in alternative use is based on interest rates issued by the Danish National Bank for the longest running bonds deducting inflation (real interest rate) and allowing for growth. The rate is 6 percent.

Using the above calculation method, Table 3 shows the size of resource rent generated by the licence-regulated Danish mussel fishery *before* the deduction of net public expenses.

Table 3.	Size of Resource Rent before Deduction of Net Public Expenses (Type A), Average 2001-2003	
	DKK Million	Percentage (%)[1]
Remuneration of Capital	59	44
Remuneration of Labour	55	41
Total (I)	114	85
Remuneration of Capital in Alternative Use	7	5
Remuneration of Labour in Alternative Use	27	20
Total (II)	34	25
Resource Rent (Type A) (III = I – II)	80	60

Source: FOI.
Notes: [1] Percentage of landing value.

During the 2001-2003 period, actual total factor remuneration in actual use amounted to DKK 114 million corresponding to 85 percent of the total landing value; whereas total factor remuneration in alternative use averaged DKK 34 million; i.e., 25 percent of the total landing value. The difference between these two values; i.e., DKK 80 million, gives the current resource rent *before* the deduction of net public expenses. This is a significant positive value corresponding to 60 percent of the total value of landings. The generation of an extremely high resource rent by the Danish mussel fishery is proof that the management system worked efficiently during the 2001-2003 period. This particular environment is characterized by a restricted licence regulation in which the admission of vessels has been modest for decades.

Net public expenses to the fishery above other industries are made up of subsidies and fisheries management costs. Public subsidies are spent on closure, breaking up, renewal, modernizing, and cost-reducing transfers to the fishery. Fisheries management costs are, for example, costs for control, biological surveys and advice. Public expenses for other businesses are not known and, therefore, they are implicitly assumed equal to the costs of other businesses. The net public expenses are known from OECD (2005) for the whole Danish fishery and in the present calculations, it is assumed that the mussel fishery's share corresponds to its share of total landings (i.e. 4 percent). Fisheries management costs are estimated on the basis of the Danish mussel fishery share of the total costs in the EU. In Table 4 below, the size of the resource rent *after* the deduction of net public expenses (type B) is illustrated.

Table 4.	Size of Resource Rent after Deduction of Net Public Expenses, Average 2001-2003
	DKK million
Resource Rent excluding Public Expenses (Type A)	80
Net Public Expenses:	
Subsidies	-8
Fisheries Management Costs	-14
Total	-22
Share of Landing Value	17%
Resource Rent including Public Expenses (Type B)	58
Share of landing value	44%

Source: OECD (2005).

In total, net public expenses amounted to DKK 22 million, corresponding to 17 percent of the total landing value. Thus, the resource rent *after* the deduction of net public expenses with DKK 58 million remains high, corresponding to 44 percent of the total landing value. The main reason for the generation of such a high resource rent was that the management system was efficient and has been so for several years.
The main feature of this restrictive licence-regulated fishery is that the entry of fishing vessels has been modest for many decades. Also, periodic closures and quota generated a positive state of mussel stocks, which contributed towards the good economic results. The extraordinarily good economic performance of the Danish mussel fishery is reflected by the fact that fishing costs are low, since the stocks are stationary and there is not considerable over-capacity.

3.2. Factors affecting the Size of Resource Rent

The resource rent identified above is only for 2001-2003, and might not necessarily be representative over a long time span. The resource rent might be over-estimated if prices are excessively high in the considered period. In addition, if the stock is over-exploited, the resource rent might fall in the future due to decreasing stock size and thereby drop in future catch potential.

Table 5 shows the most important factors influencing the size of the resource rent compared to the previous 5-year period.

Table 5. Factors affecting the Size of Resource Rent	
State of the Stock:	
Exploitation (%)	
Under	0
Full	74
Over	0
Depleted or Recovering	0
Unknown	26
Total	100
Biomass:	
Biomass 1996-2000 period (1,000 tonnes)	590
Biomass 2001-2003 period (1,000 tonnes)	363
Development	-38%
Economic Factors:	
Price 1996-2000 (DKK per kilo)	0.81
Price 2001-2003 (DKK per kilo)	1.19
Price Premium	+47%

Source: Kristiansen and Hoffmann (2004).

Seventy-four percent of the landing value (the fishery in the Limfjord) comes from a stock which is fully exploited. Stock assessments from the remaining mussel stocks in the Kattegat/Small Belt and in the Wadden Sea (26 percent) are not available. Therefore, the resource rent generated by the Danish mussel fishery was sustainable during the 2001-2003 period and is likely to be maintained in the future as well.

Kristiansen and Hoffmann (2004) analysed the development of blue mussels stocks in the Limfjord from 1996 to 2003. The largest stock sizes were registered in 1996 and 1997 (620,000 and 675,000 tonnes, respectively). Overall, biomass decreased 38 percent in 2001-2003 in relation to the previous 1996-2000 period. However, despite this fall, the fishery is assessed to be sustainable, implying that the resource rent would also be kept in the future.

The landing price of mussels increased from DKK 0.81 per kilo during the 1996-2000 period to DKK 1.19 per kilo during 2001-2003, corresponding to 47%. This increase is due to the rising purchasing power of the main fishing markets in France, Belgium, Italy and Spain. The price increase contributed positively towards the generation of a high resource rent. Provided that future prices will fall, the present high resource rent might decrease in the future. Provided that future prices will rise, the present high resource rent will continue to increase.
In total, the effect of the substantial fall in biomass is outweighed by the increase in prices. Since the stock is further exploited in a sustainable manner, it is estimated that

the resource rent calculated above has a realistic value and can be maintained in the future as well.

3.3. Instruments Needed to Potentially Increase the Resource Rent

Since the Danish mussel fishery produced a very large resource rent in 2001-2003 as specified above, the potential increase would only be marginal.
Providing the potential is realized completely, it can be claimed that the long-sighted economic society derives explicitly prioritised profits as the most important fisheries policy objective. Fisheries management will necessarily have to improve in the following areas if the resource rent potentially should rise:

a. Fish stocks should be managed in a sustainable way, both the spawning stock biomass and the fishing mortality rate;
b. Fleet capacity should harmonize with economy and biology; and
c. Automatic structural adjustment should be ensured over time.

Re a) concerns the sustainable management of fisheries obtained through the constant maintenance of the spawning stock biomass, which is below what ensures the maximal sustainable catch. Also, fishing mortality may be maintained on a level so as not to risk a future fall in recruitment. Both claims are fulfilled in the mussel fishery implying that potential increases in the resource rent from this are not possible.

Re b) regards bringing the fleet capacity in agreement with the economy and biology obtained, to minimize the total costs of all fishing vessels. This ensures the lowest number of vessels.

Potentially, the resource rent can be increased by reducing the mussel fleet. However, the seasonability of the mussel fishery sets limitations for this potential.

Re c) is important to provide an opportunity for flexibility in the fishing fleet. For example, if recruitment decreases, then the fishery has to adjust quickly in line with the new restricted catch opportunities. On the contrary, the fishing fleet and the total costs in the fishery will be too high. Also, technological developments imply that the capacity of the single vessel and the whole fleet can increase considerably, implying that the fleet should be reduced. Automatic structural adjustment can be achieved by several means. One way is making fishing rights transferable. In the mussel fishery, fishing rights are a part of the value of vessels and in that way already transferable.

Future challenges exist in the more effective structural adjustment. Hence, despite the resource rent in the Danish mussel fishery potentially increasing, the fishery can be seen as a best practice, since it generates a very large resource rent.

4. Allocation of the Resource Rent

In the Danish mussel fishery, where management systems are in place in such a way as to enable resource rents to be generated, the main task of public authorities will be to decide on their aim in terms of how much rent they wish to extract. The extreme possibilities are for the public authorities to leave all rent within the fishing industry or to take it all. Certainly both the public sector and the fishing industry have a legitimate claim of obtaining a share of the resource rent. According to the Fishery Law, the society represented by the public authorities owns the fish stocks. The owners of fishing vessels will be able to get a larger rent than in other sectors, provided that they will be prepared to undertake potentially more risky investments. The crew will also obtain a higher salary than other crews, providing they are ready to accept potentially more dangerous work.

Capital and labour should at least achieve the share of the resource rent that guarantees the fishery is maintained on a level where the total resource rent does not fall, due to decreasing fishing activities. At the same time, the rest of society, represented by the public sector as the owner of fishing stocks, also has a legitimate right to a share of the resource rent. This share is assured through the tax system in the form of income and corporate tax, but met by public expenses to the fishery in the form of subsidies and fisheries management costs.

In the mussel fishery, it is estimated that there is a potential for the public sector to obtain a larger share of the resource rent. At the same time, however, there are limitations to the opportunities of claiming this extra share. This is the case since back in time, society assigned exclusive rights to the fishery to a restricted number of fishermen who later sold them on to a new generation. In this way, the old generation who had already been paid for the fishing rights could retain the resource rent as a gift. This payment cannot be taxed with retrospectively. Therefore, the potential for the public sector primarily lies in introducing a tax on the current generation of fishermen, as the resource rent is expected to increase in the future.

The allocation of the resource rent between capital, labour and the public sector can be calculated as:

(i) Labour:
+ remuneration of labour in actual use
- income tax revenue in actual use
- remuneration of labour in alternative use
+ income tax revenue in alternative use

Labour Share of Resource Rent

(ii) Capital:
+ profits from financial expenses and tax
- corporate tax revenue
- financial earnings in alternative use
- corporate tax revenue from financial earnings in alternative use

Capital Share of Resource Rent

(iii) The Public Sector:
+ income tax revenue
+ corporate tax revenue
+ resource tax revenue
+ earnings from user's payment in the fishery
- subsidies to the fishery
- fisheries management costs

Public Sector Share of Resource Rent

The capital and labour share of the resource rent is calculated without taking into account the allocation between current and retired generations of fishermen. The selling of fishing rights from retired to current generations of fishermen is not included in the calculations. To calculate the labour share of the resource rent, the value of remuneration of labour in actual and alternative use is known from Section 3. The labour share of the resource rent is compared with the number of full-time employees given in Section 2, stating average wage in the actual fishery and in alternative use. Income tax is calculated on the basis of these average wages multiplied by income tax percentages. Income tax percentages in the fishery are identified for the average wage level, taking minimum and fishermen's tax deduction and progressive tax rates into account. The fishermen's deduction is assumed to be fully utilized. Income tax percentage in alter-

native use is calculated equally, except for the wage level being different and the fishing deduction not being in force.

To calculate the capital share of the resource rent, profits prior to financial expenses and tax deduction are calculated after allowing for depreciation. Corporate tax revenue is calculated as the corporate tax percentage multiplied by profits after financial expenses. Financial earnings in alternative use are identified as six percent of the invested capital/insurance value specified in Section 3, and corporate tax revenue in alternative use is calculated as the corporate tax percentage multiplied by financial earnings.

To work out the public sector share of resource rent, income and corporate tax revenue are included into the calculations of labour and capital share of resource rent. Subsidies to the fishery and fisheries management costs are known from Section 3.
Profits are subject to a corporate income tax of 38 percent. The tax income of the Danish mussel fishery is higher than in any other sector. Income tax percentages are calculated with regards to minimum deduction, fishermen's deduction and tax system progression, and it is determined for the average salary in the actual fishery as well as in alternative use. Income tax rates for workers in actual and alternative use are known from Statistics Denmark. These are as follows: (i) income tax rate for captains in actual use is 52 percent); (ii) income tax rate for other crew members in actual use (49 percent); income tax rate for captains in alternative use is 45 percent; and income tax rate for other crew members in alternative use is 39 percent.

Thirty percent of total labour costs are assumed to be from captains and seventy percent from other crew members.

The allocation of resource rent generated by the Danish mussel fishery among capital owners and workers *after* the deduction of net public expenses (type B) during 2001-2003 is given in Table 6 below.

Table 6. Allocation of Resource Rent Type B, Average 2001-2003

	DKK Million	Percentage (%)
Net Remuneration of Capital	33	
Net Remuneration of Labour	12	
Tax Earnings	35	
Net Public Expenses to the Fishery	-22	
Total Resource Rent (Type B)	58	
Percentage Distribution of Resource Rent		
Capital		56
Labour		20
Public Sector		**24**
Total		100

Source: FOI.

Tax earnings amounted to DKK 35 million and net public expenses averaged DKK 22 million, meaning that the Danish public sector obtained a *positive* share equal to 24 percent of the resource rent *after* the deduction of net public expenses. The capital percentage share of the resource rent is very high in the Danish mussel fishery constituting 56 percent of the resource rent. The labour percentage share of the resource rent is equal to 20 percent. Therefore, the vessel owners obtain the highest share of the resource rent generated by the mussel fishery during the 3-year period.

Turning to which instruments that can be utilized in the re-allocation of resource rent from capital and labour to the public sector, only instruments that are specific to the fishing sector are considered.

Instruments used for re-allocation of resource rent can be divided into user payments and taxes. User payments include the selling of fishing rights at auction, the collection of fisheries management costs and a reduction of favourable arrangements to the fishery, e.g. subsidies and tax deduction for fishermen. The advantage of these measures is that they are not necessarily perceived as a tax. At the same time, public expenses can be reduced substantially through the collection of costs for fisheries management such as control and biological surveys. Also, the selling of fishing rights at auction can be profitable for society, providing it takes place in a free market with a sufficient number of purchasers.

Taxation instruments include landing taxes, taxes on ownership and the selling of fishing rights. The advantage of taxes is that they are relatively easy to administrate regardless of whether they are calculated on the basis of quantities, values or prices.

Taxes calculated on the basis of values and prices are, however, more advantageous than quantitative taxation, as the latter do not have an automatic connexion with the economy. In Denmark, experiences with the collection of resource rent in fisheries by the public sector are non-existent.

The re-allocation of resource rents raise challenging, but important, policy issues concerning: (i) who owns the resource; (ii) who is to be allowed to exploit the resource and on what terms; and (iii) what distribution of rents between owners and exploiters is considered equitable. In the Danish mussel fishery, the re-allocation of resource rent to the public sector is primarily paid by capital owners, whereas the labour force bears the remaining burden.

In theory, the whole resource rent can be collected by the public sector by selling the fishing rights at auction. This collection process will take place, providing the auction system works and price formation can take place under perfect competition. However, fishing rights are already allocated implying that the public sector cannot sell them at auction.

The potential of increasing net public revenue with the application of the different types of user payments and taxes is illustrated in Table 7, assuming unchanged structure and activities in the mussel fishery. Subsidies and fisheries management costs are known from Table 4 in Section 3; whereas fishermen's deductions are equal to fishermen's extra income tax deductions.

Table 7. Increased Net Public Revenue by Re-distributing Resource Rent, Average 2001-2003

	DKK million
User's Payments:	
Abolition of subsidies	8
Collection of fisheries management costs	14
Abolition of fishermen's deductions	2
Landing Taxes:	
Introduction of tax on the same level as Iceland (2008)	3
Introduction of tax on 5%	8
Introduction of tax on 10%	16

Source: FOI.

The potential increase in net public revenue through user payments is significant with regard to the collection of fisheries management costs and the abolition of subsidies, corresponding to DKK 14 million and DKK 8 million, respectively. Contrarily, the abolition of fishermen's deductions has a minor impact amounting to DKK 2 million only. The introduction of a landing tax at the same level as Iceland when fully implemented in 2008, compared with user payments, has a relatively modest effect on net public revenue. The introduction of a tax of five and ten percent of the total landing value of mussel vessels will increase the net public revenue to DKK 15 million and DKK 30 million, respectively. Therefore, the increase in landing tax will raise net public revenue proportionally, but it is also assessed that the fishing activities of Danish mussel vessels are affected.

Subsidies are an expense for society and should be weighted against income tax otherwise collected from fisheries to obtain an overview of the public advantage for the existence of the fishery. The subsidy scheme is financed by the EU and Danish public funds.

5. Conclusions

In this case study report, the size and allocation of the resource rent of the licence-regulated Danish mussel fishery during the 2001-2003 period was analysed. The size of the resource rent *before* and *after* the deduction of net public expenses had a significant positive value, meaning that the Danish management system was very effective. This particular environment is characterized by a restricted access environment in which the entry of vessels has been low for decades. Also, our findings highlighted the fact that the fishery was close to maximal sustainable yield (MSY). Overall, the Danish mussel fishery is in a very good economic state because it is well managed.

During the 2001-2003 period, the resource rent *before* the deduction of net public expenses generated by the Danish mussel fishery averaged DKK 80 million, corresponding to 60 percent of the total value of landings. Even *after* the deduction of net public expenses, the size of the resource rent turned out to have a substantial positive value (DKK 58 million) corresponding to 44 percent of total landing value.

The Danish mussel fishery is sustainable, and the resource rent generated during the three-year period can also be maintained in the future.

Owing to the large resource rent, the potential of increasing the resource rent is small in the mussel fishery. Therefore, the Danish mussel fishery can be considered a best practice for including economics in fisheries management.

The allocation of the resource rent between capital, labour and the public authorities, *after* the deduction of net public expenses to the fishery shows that the Danish public sector obtains a *positive* 24 percent share of the resource rent. The vessel owners obtained the highest percentage share of this resource rent (56%).

The resource rent can be re-allocated from capital and labour to the society in several ways; for example by introducing a tax on landings, by phasing out subsidies or by collecting fees on fisheries management costs. However, the possibility is limited in situations where the current generation of fishermen has purchased their fishing rights from previous generations of fishermen.

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