

OCEAN AND COASTAL MANAGEMENT

**Figuring fish and measuring men:
The quota system in the Icelandic cod fishery**

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Abstract

This article discusses inequality in the Icelandic cod fishery, focusing on changes in the actual distribution of fishing quotas and the ways in which Icelanders currently talk about equity and ownership. The quota system, introduced in 1983, divided access to an important resource among those who happened to be boat owners when the system was introduced. With the fisheries legislation in 1990, the system was revised: some of the smallest boats (6-10 tons) previously excluded from quota restrictions were now incorporated in the system and, secondly, permanent quotas became effectively transferable. Our statistical findings - built on a database (the "Quota-base") we have constructed with detailed information on all vessels that have been allotted quotas from the onset of the system - show that quotas have been increasingly concentrated in the hands of the biggest companies. Meanwhile, public discontent with the concentration of quotas and the ensuing social repercussions is increasingly articulated in terms of feudal metaphors, including those of "tenancy" and the "lords of the sea."

Introduction

During the cod wars with Britain and West Germany in the 1970s, Iceland claimed national ownership of the fishing stocks in coastal waters, a highly valuable resource. The domestic fleet, however, continued to grow and catches, relative to effort, continued to decline. The first serious limitations on the fishing effort of Icelandic boats were temporary bans on fishing on particular grounds. However, by 1982 politicians and interest groups were increasingly of the opinion that more radical measures would be needed to prevent the "collapse" of the cod stock and make fishing more economical. A quota system was introduced in 1983 to deal with the problem. This system divided access to the resource among those who happened to be boat owners when the system was introduced, largely on the basis of their fishing record during the three years preceding the system. While originally the system was presented as a short-term "experiment," with the fisheries laws passed by the Icelandic Parliament in 1990 it was reinforced and extended into the distant future. The legislation of 1990 introduced two important changes to the system: first, some of the smallest boats (6-10 tons) previously excluded from quota restrictions were now incorporated, and, secondly, permanent quotas became effectively transferable. The rationale for the new laws was a complex one, but the lawmakers seem to have assumed that in order to maximize economic efficiency in the industry it was necessary both to embrace all fisheries and to ensure free marketing of quotas.

This article discusses inequality in the Icelandic cod fishery, focusing on changes in the actual distribution of fishing quotas, before and after the changes of 1990, and the ways in which Icelanders currently talk about equity and ownership. We have constructed a database (the "Quotabase") with detailed information on all vessels that have been allotted quotas from the onset of the system. These data provide an invaluable opportunity to examine changes in the distribution of quotas among boat owners, thereby shedding light on some of the social repercussions of resource management under the quota system. Our statistical findings show that quotas have been increasingly concentrated in the hands of the biggest companies. Moreover, with

effective transferability the concentration of quotas has escalated. Meanwhile, public discontent with the concentration of quotas and the ensuing social repercussions of this process is increasingly articulated in terms of feudal metaphors, including those of "tenancy" and the "lords of the sea."

Economists tend to argue that only the "hidden" forces of the market can ensure efficiency and sustainable use of resources; for them, privatization is the alternative to environmental problems, the "tragedy of the commons." The arguments for such systems are seductive and powerful in the modern world and there is no need to reproduce them here. In several fisheries in different parts of the world, fishing stocks are being turned into private property. First, the resource is appropriated by regional or national authorities and later on the total allowable catch for a season is divided among producers, often the owners of boats. At a still later stage, such temporary privileges are turned into a marketable commodity. Many scholars, however, have raised serious doubts and criticisms with respect to the theory of privatization and the tragedy of the commons.¹ More generally, it seems difficult to separate economics from politics, culture, and rhetorics.² While scientific knowledge is often conceived as an "objective" representation of the external world, in reality the scientific enterprise cannot be fully separated from its social environment. McEvoy contends, for instance, that Hardin's thesis of the tragedy of the commons represents a "mythology" of resource use.³

In the modern world, quota systems of the kind discussed in this article, and similar market approaches are increasingly adopted in response to environmental problems. Their wider social and economic implications are hotly debated, however, as they raise central questions of ethics, politics, and social theory. Market approaches to resource management are often assumed to be incompatible with egalitarian sensibilities and communitarian notions of stewardship and responsibility. Social scientists - including anthropologists and economists - should attempt to examine what the rather loose reference to the "market" entails.⁴ Studies of quota systems in fisheries and their effects are still in their infancy.⁵ Changes in the actual distribution of quotas

as well as the direct and indirect responses to such changes represent an important field of research.

The changing quota system

When the quota system was first implemented in 1984, each fishing vessel over 10 tons was allotted a fixed proportion (aflahlutdeild) of future total allowable catches of cod and five other demersal fish species. Catch-quotas (aflamark) for each species, measured in tons, were allotted annually on the basis of this permanent quota-share. Thus, while a vessel's annual quota allotment would vary in size with the total allowable catch, its permanent quota-share remained constant.

This arrangement did not go uncontested, for there were heated debates about what to allocate and to whom. The issues involved illustrate the conflict between the assumptions and rationalities of the discourse of different groups of "producers." Boat-owners argued for "catch-quotas," to be allocated to their boats. Some fishermen, on the other hand, advocated an "effort-quota," to be allocated to skippers or crews. In fishing, they argued, value was created through the application of their expertise and labour power and not that of the equipment, the boat and the fishing gear. A boat-quota would be grossly unfair since the "best" skippers would be assigned the same quota as the "bad" ones. When allocated the same amount of effort, measured in number of allowable fishing days in a season, the "good" and the "bad" skipper would catch different amounts of fish. Under a system of effort-quotas successful skippers would be rewarded for their exceptional contribution to the economy by an extra catch. The authorities partly conceded to such criticism when revising the regulatory framework of the quota system. While catches were allocated to boats and not skippers, as before, boat-owners were offered the right to choose between effort and catch. It turned out that quite a few were willing to bet on the effort-quota and the skipper, using the system as a way to increase their permanent share by improving their vessels' fishing records. The quota system has been revised several times; Table 1 shows some important moments in the history of the system.

Table 1. Some important moments in the history of the quota system

Year	Change
1975	The Marine Research Institute issues a "Black Report" predicting the collapse of the cod fishery
1976	200-miles extension of fishing limits The end of the last Cod War
1977	Limited temporary closures in the cod fishery
1981	Total allowable catch of cod is set to 430.000 tons
1983	A quota system is proposed for one year for demersal species Total allowable catch of cod 370.000 tons
1984	The quota system takes effect Total allowable catch of cod 220.000 tons Revision of quota laws
1985	Effort-quotas are introduced as an alternative to catch-quotas
1988	All fishing boats, six tons or larger, are subject to permits New laws: fishing stocks on Icelandic fishing grounds are defined as "the common property of the Icelandic nation"
1990	Indefinite application of quota-laws Redefinition of "fishing year" (1 Sept. to 31 August) The system of effort-quotas is discontinued All fishing vessels over 6 tons are allotted catch-quotas The selling of permanent quota-shares is allowed The laws define special permits for "sport fishing for private consumption" Total allowable catch of cod 238.000 tons
1991	Total allowable catch of cod 245.000 tons
1993	The "Two-Headed Committee" issues a report

From the beginning of the quota system, boat owners could transfer their annually allotted catch-quotas relatively freely - in effect temporarily renting their permanent share of a single year's total allowable catch. Direct transactions with a vessel's permanent share were, however, not permitted. Such transactions could take place indirectly when a vessel changed hands, but in general permanent quotas could only be transferred between vessels if the "donating" vessel was thereafter excluded from further participation in the quota system. With the new fisheries management legislation in 1990 at least three significant changes were made to the quota system. First, the former restrictions on direct transactions with permanent quotas between boat owners were lifted - in other words, permanent quotas became formally transferable. Secondly, the effort-quota system was abandoned and all boats were allotted catch-quotas. Finally, the quota system was expanded by including all 6-10 ton fishing boats. These boats, not previously subject to effective catch limitation, were now allotted permanent quota-shares of the total allowable catch. This entailed an addition of approximately 900 boats with catch-quotas, and a subsequent increase in the number of quota holders by 156% (from 451 in 1990 to 1155 in 1991).

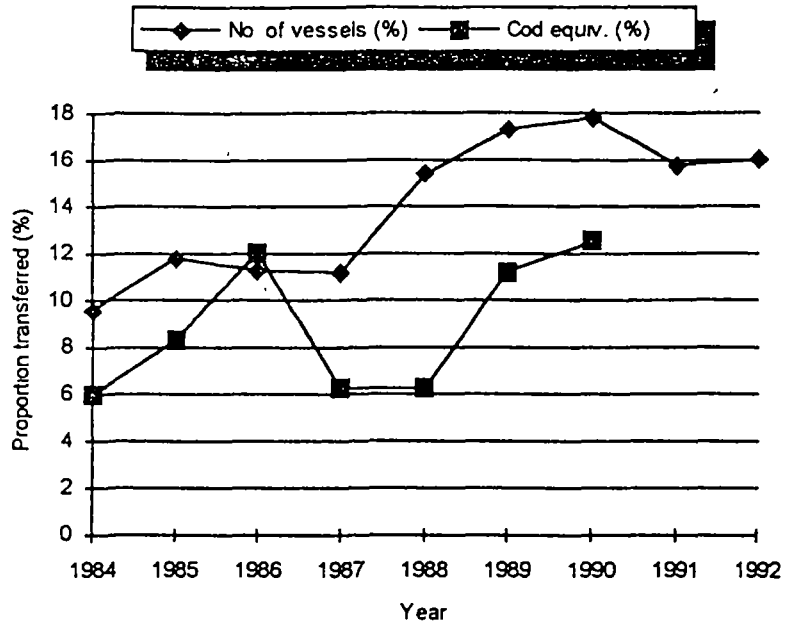
The following analysis, based on descriptive statistics, focuses on changes in the actual distribution of quotas. Needless to say, the changes to the quota system with the 1990 legislation make analyses of quota distribution and its effects over time somewhat problematic; but given their significance, it seems logical to analyze the latter period, from 1991 to 1994, in two different ways. In the first case, both periods are examined, excluding all 6-10 ton boats with catch-quotas after 1990, thereby making comparison with the earlier period more acceptable. In the second case, analysis is exclusively limited to the latter period, including all boats with catch-quotas and observing to a greater extent the impact of the 1990 fisheries management legislation. The basic unit applied here is that of "cod equivalents" (þorskigildi). A boat owner is allotted catch-quotas in several species with different market values (cod, haddock, saith, etc.), but the overall size of each individual quota may be measured in

terms of a single unit, cod equivalents - an aggregate measure based on the market value of each species.

The distribution of quotas: both periods (from 1984 to 1994)

Despite restrictions on direct transactions of permanent quota-shares before 1990, boat owners were still able to sell their permanent quota. In particular, boat owners could sell their boats, and thereby their permanent share of the catch. As quotas were attached to boats, boat owners could add to their share of the permanent quota by buying other boats. If we look at such indirect transactions of permanent quotas (see Figure 1) - that is vessel transactions - we see that they show a substantial increase from 1984 to 1990. The proportion of quotas, measured in cod equivalents, that changed hands through the sale of vessels doubled in six years, from 6% to 12.5% (the upswing in 1986 is due to the privatisation of a fishing company that controlled the largest share of permanent quota, formerly the property of the capital, Reykjavik City). It is difficult to estimate the amount of capital involved in such transactions, but there were reports of vessels having been sold at a price two or even three times that of their "real" value. Permanent access to the resource, therefore, was no less valuable in monetary terms than the vessel itself.

Figure 1. Vessel and quota transactions



Boat owners were also able to increase their permanent quota-share by exploiting certain loopholes in the system. Those who were dissatisfied with the size of their permanent share and the annual catch-quota it yielded could choose to fish under the effort-quota system, in which case the size of the catch was effectively not restricted. If successful, a boat owner could then return his vessel to the system of catch-quotas after one year, with his boat's enlarged permanent quota-share. Boat owners could thus increase their boats' permanent share of the total allowable catch, at the expense of other boat owners, by fishing successfully under the system of effort-quotas. It seems, therefore, that permanent quota-shares had been changing hands before the fisheries management legislation in 1990 lifted the restrictions on such transactions.

How are quotas distributed, then, and what changes in distribution have occurred over time? Figure 2 shows changes in the total number of quota-holders from 1984 (excluding 6-10 ton boats for 1991-1994) and the relative size of four groups of quota-holders, "giants," "large" owners, "small" owners and "dwarves" - those who own more than 1% of the permanent quota-shares, 0.3-1%, 0.1-0.3% and 0-0.1%, respectively. While being arbitrary, the demarcation of these groups provides a simple

and effective way of discerning distributional changes of permanent quota-shares among boat owners, taking into account the fact that the distribution is positively skewed. As shown in Figure 2, there is a constant and significant reduction (26.9%) in the total number of quota-holders, from 535 to 391. Moreover, the number of "giants" increases gradually from 1984, while all other groups generally diminish in number.

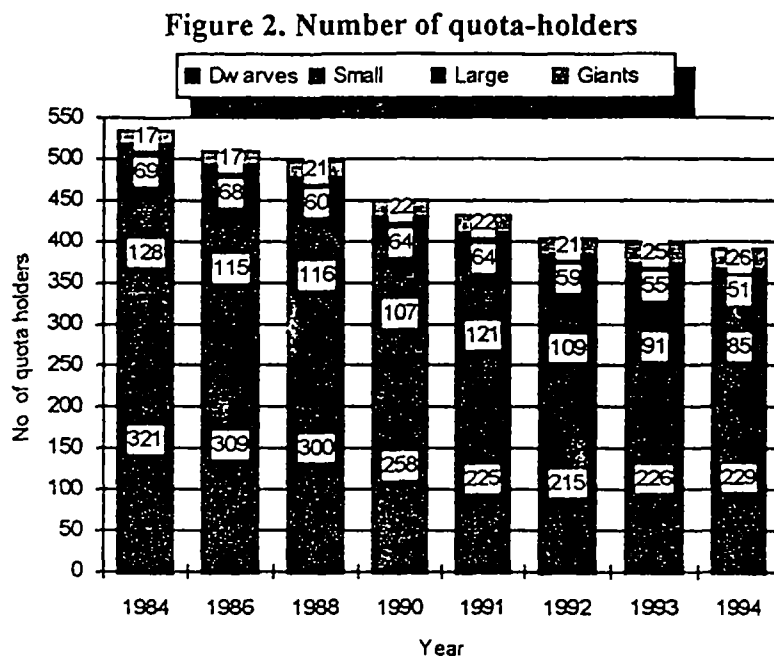
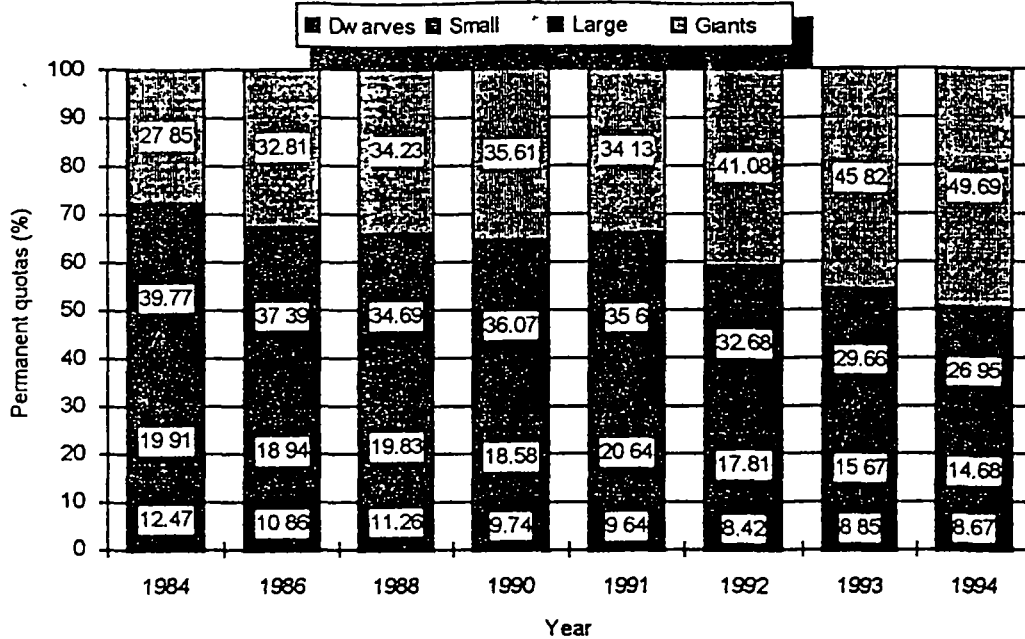


Figure 3 shows the sizes of permanent quota holdings belonging to the four groups of quota owners. Over this eleven year period the "giants" increased their aggregate share by 78,4%, with their average share going from 1.64% in 1984 to 1.91% in 1994. The aggregate shares of all other groups decrease. Moreover, in the case of the "dwarves" and "large" owners, average shares are slightly reduced - 0.039% to 0.038% and 0.58% to 0.52%, respectively. Consequently, it is clear that in addition to the concentration caused by the decrease in the number of quota-holders, the larger companies seem to be accumulating a disproportionate share of the permanent quotas.

Figure 3. Quota distribution 1984-1994

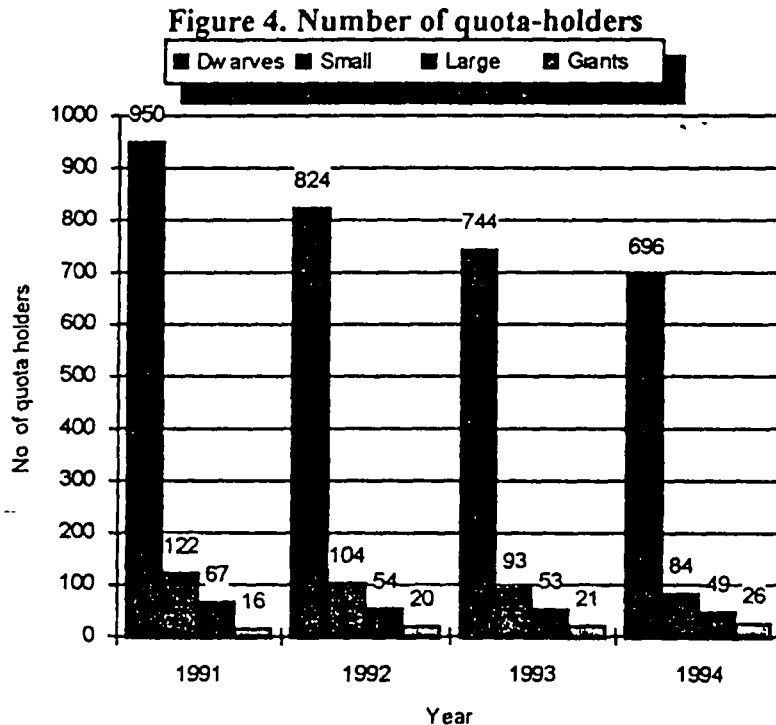


It is evident, then, that while quotas were gradually becoming concentrated in the hands of fewer companies up to 1990, this process gained increased momentum after 1990, when the new legislation made permanent quota-shares directly transferable. This is perhaps inevitable, given that the main purpose of transferability of permanent quotas was to achieve efficiency in the fishing industry, making it easier for profitable fishing companies to buy out the quota of those that were less well managed.

The distribution of quotas: the latter period (1991-1994)

With the fisheries management legislation passed in 1990, 704 new quota-holders were added to the quota system in the demersal fisheries. Bearing in mind the aforementioned objectives of efficiency to be achieved by the transferability of permanent quotas, what changes in distribution of permanent quotas have occurred since 1991? As before, one way of establishing this is to examine changes in the number of quota owners (including 6-10 boat owners). Figure 4 shows changes in the total number of quota-holders and the relative size of the four groups of quota-holders

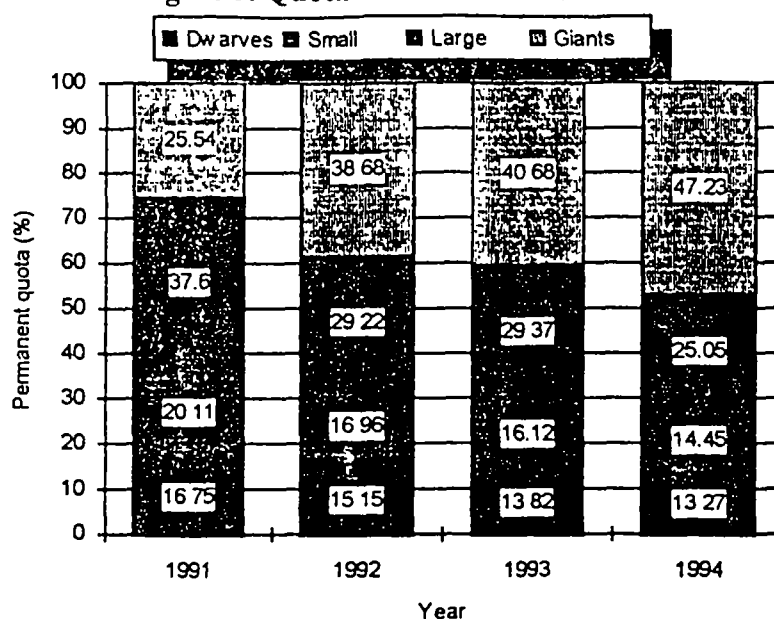
defined above. First, there is a constant and significant reduction (26%) in the total number of quota-holders, from 1155 to 855. Moreover, while the number of "giants" increases by 62,5%, all other groups diminish in number - the most notable case being that of the "dwarves," whose number decreases by 254 in four years (26,7%). These figures plainly indicate the growing concentration of quotas in the hands of the larger companies, who seem to be buying out a significant proportion of the smaller quota-holders¹. It is especially interesting to note that most of the quota-holders categorised as "dwarves" were newcomers to the quota system in 1991 - the owners of 6-10 ton boats.



The reduction in the number of quota-holders indicates an increased concentration of permanent quotas among those that remain. Figure 5 shows that the "giants" increase their permanent share of the total allowable catch by 85% (from 25.54% to 47.23%), with their average share going from 1.60% in 1991 to 1.82% in 1994, despite being the only group to increase in number. The aggregate share of all

other groups diminishes. However, due to a severe decrease in numbers, the average quota-shares of "dwarves" and "small" quota-holders increase slightly; 0.018% to 0.019% and 0.16% to 0.17%, respectively. Thus, an analysis of the latter period, including all quota-holders, reveals that permanent quota-shares are becoming increasingly concentrated in the hands of fewer holders, especially at the top.

Figure 5. Quota distribution 1991-1994



Inequality and the distribution of quotas

Inequality may be measured in many ways⁶ Sen has proposed a dual classification of inequality measures.⁷ On the one hand there are what he calls positive measures, employing objective statistical indexes of relative variation within a distribution. On the other hand there are normative indexes, measuring levels of inequality in terms of subjective notions of social welfare. The evaluation of economic inequality by comparison of an existent distribution of wealth to an ideal condition of social welfare may in part be traced back to Aristotle, based on subjective conceptions of efficiency and justice he maintained that there should not be more than a five to one ratio between the wealth of the richest and that of the poorest⁸ Measuring inequality on the basis of such preconceived notions of justice is likely to be highly controversial, given that subjective notions could lead students of inequality to radically different conclusions for the same distribution. However, as Sen points out, while it may be possible to compare levels of inequality in alternative distributions measured objectively with positive measures, such comparisons are meaningless when viewed apart from ethical issues⁹ Thus, while in practice it is impossible to separate ethical

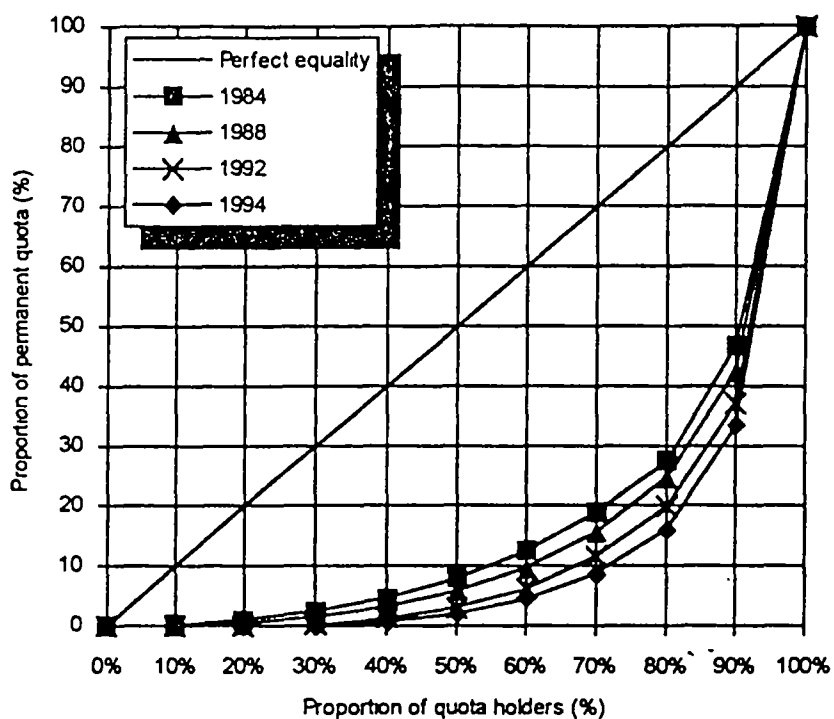
issues from the measurement of inequality, arguably such issues should be raised both prior to and after measurement itself.

In the following analysis we use two positive measures of inequality, Lorenz curves and the Gini-coefficient. The Lorenz curve conveys a graphical representation of distributional inequality and concentration, while the Gini-coefficient interprets a Lorenz curve in the form of a numerical index. Operationally, these inequality measures establish the level of distributional inequality in a system as "the number or proportion of units that must be redistributed in order to create uniform shares";¹⁰ in other words, the amount of permanent (surplus) quotas needed to be redistributed to create a condition of perfect equality. These measures also reveal the concentration of permanent quotas - for example, the extent to which the surplus is located at the largest one company, ten companies or fifty companies.

Measuring inequality in the Icelandic fisheries is problematic due to the annual reduction in the number of quota-holders. Most inequality measures react directly to such changes by indicating a greater degree of equality, since fewer small holders means that less needs to be redistributed in order to attain perfect equality. One way of making measures sensitive to increased inequality caused by reduction in the number of quota-holders is to include those dispossessed as null components - in our case, quota-holders with no permanent quota. Such a procedure may have its drawbacks; the dropouts, it may be argued, are not necessarily dispossessed, they have simply sold their quota-shares. However, excluding them in our analyses would obviously distort the measurements. As Coulter points out in another context, "if nine equally large landowners seized the land of the remaining one hundred very small farm owners and divided it equally among themselves, many inequality measures would indicate a change from gross inequality to virtually perfect equality."¹¹ Using the procedure of including the dropouts as null components, the Lorenz curve and the Gini coefficient provide an effective way of simultaneously displaying inequality and concentration in the distribution of permanent quotas

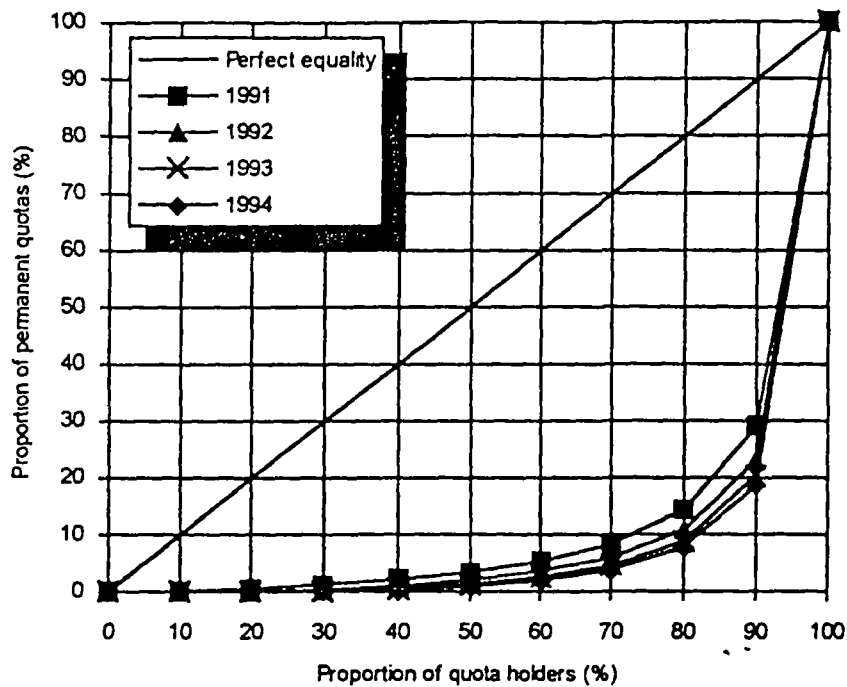
Lorenz curves plotted for four years of the period 1984 to 1994 are shown in Figure 6, once again excluding 6-10 ton boats after 1990. The horizontal axis (X-axis) shows quota-holders arrayed in ascending order; the first interval represents the smallest 10% of quota-holders, while the last interval represents the largest 10%. The vertical axis (Y-axis) shows the proportional share of permanent quotas. Thus, it can, for example, be inferred from Figure 6 that in 1984 70% of the smallest quota-holders owned just under 20% of all permanent quotas, while in 1994 the same proportion of quota-holders owned just under 10%. An increase in the area between the line of perfect equality and the Lorenz curves for each year represents a subsequent increase in the level of inequality. Moreover, the shape of this area represents the degree of concentration of permanent quotas. Judging from Figure 6 there is a continual increase in the level of inequality and a growing concentration of quotas at the top.

Figure 6. Lorenz curves for 1984 to 1994 (excluding 6-10 ton boats)



The Gini-coefficient provides an accurate numerical expression of the degree of inequality presented by a Lorenz curve. This coefficient represents the ratio obtained by dividing the area between the line of perfect equality and the Lorenz curve of a specific year by the total area under the line of perfect equality. Hence, complete inequality gives a Gini-coefficient of 1, while perfect equality gives 0. If we examine the total time-span of the quota system from 1984, excluding as before 6-10 ton boats for 1991 to 1994, the Gini coefficient increases for each consecutive year - from 0.677 in 1984 to 0.715 in 1988, 0.769 in 1992 and, finally, 0.799 in 1994 (see Figure 6 for the corresponding Lorenz curves). If 6-10 ton boats are included for the period after 1990, a similar pattern emerges, the Gini-coefficient being 0.800 in 1991 and 0.874 in 1994 (see Figure 7). The data, then, indicate a substantial increase in the level of inequality in the distribution of permanent quotas from 1984, with an escalation of this process after the 1990 fisheries management legislation.

Figure 7. Lorenz curves for 1991 to 1994 (including 6-10 ton boats)



Equity, efficiency and "quota-profiteering"

Following bleak estimates of the fish stocks by marine biologists, politicians have made recurrent cuts to the total allowable catch since 1989, effectively devaluing permanent quota-shares. Consequently, many small operators were left with insufficient catch-quotas to keep their boats active throughout the fishing season. While a number of small companies seem to be persevering, many supposedly "inefficient" operators were forced to sell their permanent quota-shares and leave the quota system, as indicated by our results (see Figures 2 and 4). Meanwhile, other more affluent companies, often referred to in public discourse as "quota-kings" (*kvótakóngar*) and "lords of the sea" (*sægreifar*), have been accumulating permanent quotas (see Figures 3 and 5), in some cases more than they are able or willing to fish themselves. One interpretation of the data presented above is that the objectives of efficiency in the fishing industry are being attained. Hence, it may be argued, the "invisible hand" of the market has simply shifted the distribution of quotas to a state of greater efficiency, by reducing the number of

quota-holders and concentrating permanent quotas in the hands of larger companies. However, as our results indicate, such increases in "efficiency" take place at the cost of equity. Indeed, many scholars have suggested that such a trade-off is inevitable.¹² Whether increasing distributional inequality and concentration of quotas really are indications of greater efficiency and, if so, in what respect, is not at issue here. An analysis of the trade-off between equality and efficiency, and the ethical issues entailed in finding the "proper" ratio of the two, is beyond the scope of this article. In what follows we will merely examine some of the repercussions of the changing distribution of permanent quotas in the Icelandic fisheries.

One consequence of this process can be detected in the quota rental market. At first, boat owners leased quotas mainly to meet fluctuating short-term needs and deal with bycatch problems and the changing needs of local markets (for example, by trading haddock quotas for cod quotas). However, eventually some quota holders came to discern that considerable profits could be made in the rental market, particularly with many fishing operations suffering from the "devaluation" of permanent quota-shares resulting from successive reductions made to total allowable catches after 1988. The standard rental price paid by "recipients" in such transactions is approximately 40% of the value of the catch (generally equivalent to 20% of the price of permanent quota shares), although when quotas are scarce at the end of the fishing year prices have been known to go up to 70% of the value of the catch. For the companies "donating" the rented quota, then, this represents a lucrative business transaction. By renting a part of its permanent share, a company can free itself from the expenses of actually catching the fish, while still procuring 40% of the value of the resulting catch. In public discourse this situation is frequently referred to by the loaded term of "quota-profiteering" (*kvótabrask*).

Although data relating to the rental market are not readily accessible prior to 1991, preliminary research seems to indicate a steady increase in the quantity of quotas changing hands through such transactions. After the changes made to the quota system in 1991 many of the new small scale operators found their first catch-quota allotments,

insufficient to maintain their fishing enterprise. Thus, in the face of recurrent "devaluations" of permanent quota-shares, and lacking the financial backing to acquire extra permanent quota-shares, their reaction to this seems to a large extent to have taken the form of selling out or placing their quotas on the rental market. At the same time, facing the same permanent quota "devaluations", the larger companies were looking to increase their share in the total allowable catch, and as our results indicate they did this both temporarily by leasing quotas from smaller holders and by buying up permanent quota-shares. However, in the subsequent two years the course of rental transactions shifted dramatically. By way of assessing this transformation it is illuminating to note the changing proportions of operators that are recipients of leased quotas within each of the groups of quota holders previously defined. Thus, while the percentage of "giants" leasing from others goes from 75.0% to 38.1% in the space of two years, at the same time, the proportion of "small" quota holders doing the same rose from 46.3% to 65.6%. Furthermore, in 1993 we see the emergence of a new state of affairs, with the "giants" being almost the sole "donators" of net leased quotas while "dwarves" and "small" quota-holders are now "recipients" (see Figure 8).

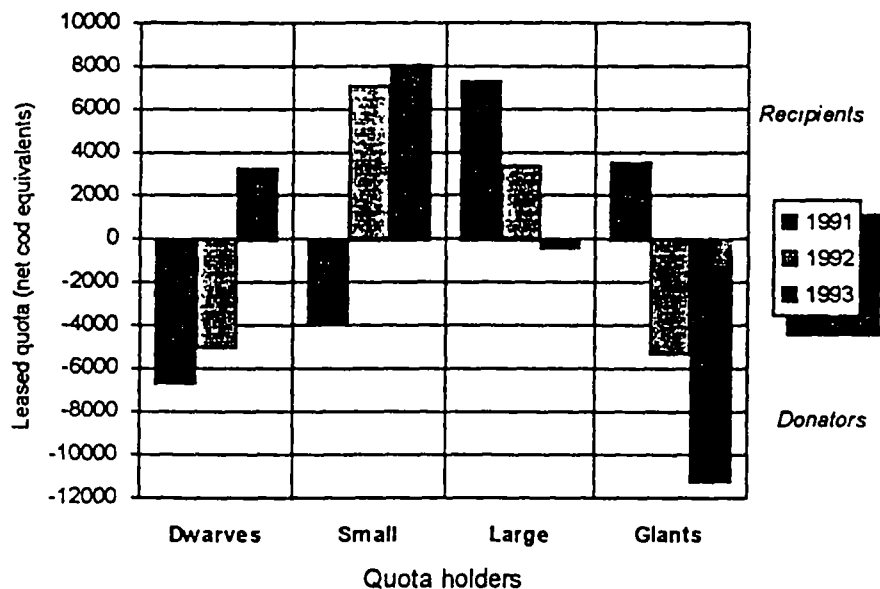
The largest companies, now in possession of a large proportion of the permanent quotas, are increasingly sending their vessels to exploit fishing stocks in foreign waters, while leasing their quotas to less prosperous operators. This state of affairs has lead many fishermen to describe the quota system in feudal terms, with the "quota-kings" or "lords of the sea" controlling most of the quota and profiting from renting it to "tenant" companies, who actually do much of the fishing. After paying the rental price, the "tenant" companies are left with only 60% of the value of the catch, while still bearing all the normal expenses of fishing. As one skipper put it in an interview:

if they fish, they do so vigorously while fishing their own quotas,
after that they end up in the tenancy-system... a system which gives

them no earnings; all the profit goes to those who own the quota, the quota-kings.

In the "tenancy" system it is the "quota-kings" who make the rules; not only do they own most of the permanent quotas, they also control many of the plants that buy the catch. Thus, quoting the same skipper again: "one must give in to almost every demand, because the quota-king makes all the rules, set the price and everything." However, the "quota-kings" themselves view the matter from a totally different perspective, maintaining that most of the so-called "lords of the sea" are really on the verge of bankruptcy and citing envy as the source of the feudal metaphors.

Figure 8. Leased quota (netto, demersal species)



By law, fishermen receive a fixed share of the value of the catch.

Understandably, however, the "tenant" companies try to minimise their additional costs, represented by the renting of quotas, by cutting the wages of fishermen.

Increasingly they reckon fishermen's wages from the amount left after the rental price has been subtracted from the value of the catch. In such cases, fishermen working for "tenant" companies may suffer up to 40% wage-cuts - in effect, "paying" a sizable part

of the rental price of permanent quotas to the "quota-kings." Significantly, Icelandic fishermen went on a national strike in January 1994, protesting against "quota-profiteering" and the "tenancy" system, leading to a two-week stand-still in the fishing industry. The government put an end to the strike by passing temporary laws to force the fishermen back to work.

While the feudal metaphors used in public discourse are, perhaps, not wholly warranted, it seems that the concentration of quotas in the hands of the largest companies is having a far-reaching effect on the Icelandic fisheries. According to fishermen, "quota-profiteering" is increasing. Such a claim seems to be confirmed by empirical research on the rental market of permanent quotas.¹³ These developments inevitably raise important questions regarding the ownership of quotas and the fishing stocks. Indeed, the question of who owns the fish in the sea has become a central issue in Icelandic political debate. Boat owners claim that they alone are entitled to the rents produced by the quota system. The traditional usufruct rights of boat owners, they argue, should be transferred into permanent "ownership" of the fishing stocks in the form of a fixed share of the catch, a transferable quota. For them, the quota system is only a logical extension of the cod wars and the arguments favoured by the Icelandic government; a "rational" use of resources, they claim, can only be expected as long as the ones who use them are dependent upon them as owners. Fishermen often insist, on the other hand, that as the "real" producers of wealth they are entitled to quotas. As one skipper put it:

who has more rights concerning quota-payments . . . , the man who hires crew-men, the one who finds the fish and brings the catch ashore, or the boy who inherits the boat of his father but has never been at sea?

The allocation of quotas to skippers on the basis of their fishiness, some skippers have argued, would be economical in the long run; costs and effort might be significantly reduced by making fishing the privilege of the most efficient skippers.

During debates on the fisheries laws enacted in 1990, some members of Parliament raised doubts about the "legality" of the quota system, arguing that proposed privileges of access might imply permanent, private ownership which contradicted some of the basic tenets of Icelandic law regarding public access to resources. Lawyers concluded that the kind of quota system under discussion in Parliament was in full agreement with the law and that quotas did not represent permanent, private property.¹⁴ The laws which eventually were passed reinforced such a conclusion by stating quite categorically that the aim of the authorities was not to establish private, government-protected ownership.

It seems clear, however, that boat owners have become de Facto owners of the fishing stocks. The tax-authorities have decided, one may note, that quotas are to be reported as "property" on tax-forms and that the selling of quotas involves a form of "income." Recently, the Supreme Court resolved, in a case between a fishing company and the Minister of Finance, that accumulated permanent quotas represented private property liable to taxation. While in the early stages, quota systems only imitate private property rights, later on true property rights, similar to those found in western agriculture, may develop¹⁵

Conclusions

Our analysis of the Icelandic cod fishery, focusing on changes in the actual distribution of fishing quotas, indicates a growing inequality; permanent quotas have been increasingly concentrated in the hands of the biggest companies. Also, with effective transferability of permanent quotas after 1990 the concentration of quotas has escalated. We need to keep in mind, though, that some, if not all, of the "giant" companies are owned by a large number of share-holders. One could argue, therefore, that the concentration of quotas described above really masks a more egalitarian

distribution of access and ownership. However, this is not necessarily the case. For one thing, it is quite probable that some individuals own shares in several different companies; thus, the distribution of ownership of quotas may be even more unequal than our figures indicate. Moreover, the distribution of holdings within the biggest companies may be very uneven, with few individuals controlling the majority of the shares - making the total number of share-holders insignificant. Finally, even though share-holders turned out to be more numerous than before, in actual practice a small group of managers have immense powers in their hands; they are the ones who control access to the resource, how the resource is used, what happens to the products, and how the benefits are distributed. Currently (in 1994), only twenty six companies (the "giants") own about half of the national quotas in the demersal fisheries. Significantly, public discontent with the concentration of quotas and its social and political repercussions - including "quota profiteering" - is increasingly articulated in terms of heavily loaded feudal metaphors, of "tenancy," "quota kings," and the "lords of the sea."

With the quota system, capitalist production in Icelandic fishing has been subject to stringent regulations and "scientific" control. Generally, both marine scientists and economists have presented the coastal ecosystem as a predictable, domesticated domain. The contrary voice, however, is also raised at times. Knowledge of the ecosystem, it is argued, especially by fishermen, is too imperfect for making reliable forecasts. Some people even go further, arguing that multi-species fisheries are chaotic systems with too many uncertainties for any kind of control, such arguments have been developed in the scholarly literature on fisheries management by Wilson and his associates.¹⁶ Skippers' extensive knowledge of the ecosystem within which they operate is the result of years of practical enskilment, the collective product of a community of practice¹⁷ If marine ecosystems are chaotic and fluctuating regimes, those who are directly involved in resource use on a daily basis are likely to have the most reliable information as to what goes on in the system at any particular point in time. There may be good grounds, then, for exploring more closely how fishermen

acquire their practical ecological knowledge, how their knowledge differs from the textual knowledge of professional biologists, and to what extent the former could be brought more systematically into the process of resource management. In Icelandic fisheries management, there is very little attempt to utilise the knowledge that skippers have achieved, skippers frequently complain that marine biologists tend to treat them "as idiots," reducing practical knowledge and local discourse to mere "loose talk." In some fisheries, however, including the lobster fishery of Maine in the United States, the relations of power between local fishermen and experts in marine biology seem to be the reverse, without detrimental effects for the reproductive potential of the species exploited.¹⁸

There is a strange paradox in Western environmental discourse. On the one hand, we tend to project an image of resource management as an a-political enterprise, the "rational" application of mathematical equations independent of social discourse, assuming at the same time that the "optimum" use of resource-bases necessitates that they are parcelled up and privatized. On the other hand, modern environmental discourse is characterized by the postmodern condition and "neototemic" thought,¹⁹ a discourse that emphasizes, much like medieval European discourse, the interrelatedness of nature and society.²⁰ While such a view seems to have been regaining ground, for a variety of reasons, some scientific communities stubbornly stick to Baconian notions of scientific methods, of "observation", and the domination of nature. Policy makers in fisheries often remain firmly committed to a positivist and modernist stance, curiously innocent of recent developments in social and ecological theory, presenting themselves as detached observers, as pure analysts of the economic and material world.²¹ One illustration of scientism in the discourse on resource management is the suppression of inequality and social distribution, a neglected theme frequently pushed to the margin or simply ignored

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