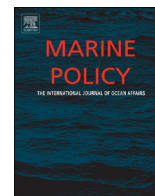




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## Consolidation and distribution of quota holdings in the Icelandic fisheries

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## ABSTRACT

The aim of this work is to measure the development of the concentration of quota holdings by harvesting companies and harbours in Iceland. For the period 1990–2014, the analysis traces the development of relative quota holdings of the biggest actors operating large vessels as well as firms that employ smaller boats that are only allowed to use hook-and-line. A more detailed data set is used for the period 2001–2014 which allows for a more thorough investigation of consolidation in both fleet segments using Herfindahl–Hirschman Indexes, Gini coefficients and Lorenz-curves. The biggest firms in the two fleet segments increased their share of quotas throughout the period but the quota market is though still quite competitive. The distribution of quotas between firms has become more unequal, and there is also clear evidence of increasing transfers between harbours, especially in the case of the quota shares of hook-and-line boats. However, the results also indicate that spatial concentration has been much less than consolidation at firm level during the period under consideration. This would indicate that firms have mostly grown in size by merging with local firms or buying out smaller local operators.

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### 1. Introduction

In the last 40 years rights-based management regimes, including individually transferable quotas (ITQs), in fisheries have become ever more prominent. A recent estimate puts the number of such programs at 647 [1], representing about 25% of global fish landings [2]. Economic theory teaches that introducing ITQs into an overcapitalised fishery will bring about considerable efficiency gains [3], not least through the reduction of fishing capacity as more efficient operators will buy out those less efficient. This is indeed borne out by experience [4,5]. For instance, studies on the Alaskan Pacific halibut and sable fisheries [6], the British Columbia halibut fishery [7,8], the Scotia-Fundy groundfish fishery [9–11], the Mid-Atlantic surf clam and ocean quahog fishery [12], the New Zealand Quota Management System [13,14], the Norwegian pelagic and cod fisheries [15], the Tasmanian red rock lobster fishery [16], the Great Barrier Reef fin-fish fishery [17] and the Icelandic fisheries [18–21,22] all reveal how fishing fleets shrank after individual vessel quotas were implemented and made transferable.

In the industrial organisation literature, various measures have been utilised for the analysis of market structure [23]. Some of these measures have also been employed to study consolidation in

the fishing industries. These include the application of simple concentration ratios (CR) [18,19,21,24] as well as the Herfindahl–Hirschman Index (HHI) to measure market concentration [14,24–27]. Other inquiries have made use of so-called Lorenz curves and their numerical equivalent, the Gini-coefficient, which are frequently used in studies of the distribution of income and wealth. Pálsson and Helgason [18] apply this approach to study consolidation in the Icelandic fisheries 1984–1994, Liew [10] to analyse concentration in Canada's Scotia-Fundy inshore groundfish fishery 1990–1998 and Connor [25] to examine consolidation in the inshore, mid-depth and deep-water fisheries in New Zealand during 1987–1998. More recently, Abayomi and Yandle [14] have employed conditional Gini coefficients and conditional Lorenz curves to study changes in ownership from the start of the ITQs in 1987–1990 to 2007–2009. Gini coefficients have also been used to analyse consolidation in the red snapper fishery in the gulf of Mexico [26].

As one of the first countries to introduce individual transferable quotas in the 1970s and 1980s, Iceland has over 30 years of experience with management systems based on property rights. Individual vessel quotas (IQs) were first imposed on the pelagic fisheries and then in 1984 on the main demersal fisheries [28,29]. By 1988, a system of ITQs was in effect for all fisheries, although an effort quota option was still retained in the demersal fisheries. Since 1990, a comprehensive ITQ-system has been in effect for all vessels larger than 6 gross registered tonnes (GRT). Smaller boats

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were managed by a complex set of rules and regulations until the early 2000s, when this intricate management web was phased out and the small boats were incorporated into the ITQ regime [30].<sup>1</sup> The small boats are only allowed to use hand-line and longline, but no such restrictions apply to larger vessels. Quota transfers from boats operating only hand-line and longline to larger ones are prohibited, but transfers in the reverse direction are not. Therefore, to a degree, these two fleet segments may be seen as operating under separate quota systems.

In this paper, consolidation in the two fleet-segments of the Icelandic harvesting sector is analysed using all three methods outlined earlier; concentration ratios, HHI and Lorenz curves and the associated Gini coefficients. Discussion first centres on the development of relative quota holdings of the largest harvesting companies in each fleet-segment during 1991–2014. For the larger vessels, this covers the period since the comprehensive ITQ-system came into effect in 1990 while for the smaller boats the study covers the period since that fleet segment was included in the ITQ-system in 2001. This is followed by a more thorough analysis of the consolidation that has occurred, based on the calculation of HHI and construction of Lorenz curves and the associated Gini coefficients. The data set used for this purpose only covers the period 2001–2014, but is more detailed and allows both for a study of changes in the distribution of quota holdings between individual firms as well as between communities. As before, the development in each fleet-segment is studied separately. The spatial dimension makes it possible to determine whether the largest firms have grown by buying quotas from operators all over the country, or whether consolidation has mainly occurred at a local level, leaving the distribution of quotas between communities (districts) relatively unchanged.

## 2. The Icelandic ITQ system

Since 1990, management of the Icelandic fisheries has been based on the Fisheries Management Act and its subsequent amendments [31]. At present, the ITQ system applies to fisheries for various species that together make up 98% of landed value [30]. Quotas are assigned to individual vessels but are transferable. Initial quota allocations were based on previous fishing history, but quota holdings have since changed as a result of quota transactions, with many of the original holders no longer active. The management system distinguishes between two kinds of quota in each fishery: quota shares and harvest rights. The former are sometimes called “permanent quotas” and the latter “annual catch entitlements” or “catch shares”. Quota shares quantify the holder’s entitlement to a percentage of each year’s total allowable catch (TAC) in each fishery. A vessel may, for instance, hold a 1% share in the cod fishery. Once the TAC has been set, the harvest rights for the fishery in question are simply calculated as the product of the vessel’s quota share and TAC. Each summer, based on available data and stock assessments, the governmental Marine Research Institute (MRI) publishes its advice on how large the TAC should be for each species in the ensuing fishing year (September–August). While the Minister of Fisheries does have powers to deviate from these recommendations, it has in recent years adhered, for the most part, to MRI’s advice. The precautionary approach taken by MRI has generally been quite successful, notably for cod, Iceland’s most important fishery, where the stock has rebounded in recent years and is now considerably larger than in 1990 [32].

<sup>1</sup> In the summer of 2009, a new small open-access fishery with a cod-cap opened up for boats operating hook-and-line. This is discussed in more detail in Section 2.

Currently, there are two different types of general fishing permits, general fishing permit with a catch quota and a general fishing permit with a hook-and-line quota. In what follows the former are called regular quotas and the latter hook-and-line quotas. Hook-and-line quotas may only be utilised by boats smaller than 30 GRT that only use hand-line or longline. Both quota shares and harvest rights are transferable between vessels within each size category. Transfers from regular quota vessels to hook-and-line vessels are allowed but quotas may not be transferred from boats holding hook-and-line quotas to vessels holding regular quotas. Quota shares are perfectly divisible and may be transferred wholly or in part, provided that the transfer does not result in the quota share of the receiving vessel obviously exceeding its fishing capacity. In the case of vessel sales, municipal authorities have first refusal on vessels holding quotas that are to be sold to operators in a different municipality. This provision has very rarely been exercised. The combined quota shares of fishing vessels held by individual parties in each fishery may not exceed a certain maximum, which is 12% of the total quota shares in the case of cod, but 20% for haddock, saithe, Greenland halibut, herring, capelin and deep-water shrimp, and 35% for redfish. Maximum holdings are much smaller for vessels with hook-and-line quotas: 4% of the total quotas allocated to vessels in this category in the case of cod and 5% for haddock. Quotas of different species may be added together in tons or kg. using cod equivalents. These are defined in the Fisheries Management Act as the unit value of each species relative to the unit value of cod, the most important fishery. The cod equivalents are calculated for each fishing year on the basis of the average unit value of the landings of each species during the previous May–April period. For vessels operating under the regular quota system, the combined share in all fisheries may not exceed 12% in cod equivalents, but the corresponding maximum for hook-and-line boats is 5%. While harvest rights are also perfectly divisible, vessels must utilise at least half of their harvest rights each fishing year or else forfeit their quota shares. This applies to both hook-and-line boats as well as to larger ships.

When the comprehensive ITQ system was introduced in 1990, it only applied to vessels larger than 6 GRT. Smaller vessels could choose between entering the quota system or remaining outside the quota system. Almost all vessel owners opted for the latter. During the next decade, many different kinds of effort restrictions were used to limit the catches of these “outsiders”, although the drawbacks of continuing to use effort restrictions were plain to see [30]. Finally, in 1999, operators of these small boats were given a choice between effort restrictions with transferable fishing days and a quota system that came into effect in the fishing year 2001/2002. Over the next few years, the effort restrictions were slowly phased out. The number of boats still under the effort restriction system shrank from 219 at the beginning of the fishing year 2001/2002 to 14 in 2004/2005, with the last two boats entering the quota system two years later.

In 2009, a new coastal fishery was set up in order to open up possibilities for new entrants and increase flexibility. All registered boats, including those holding quotas, may join the fishery which runs during May, June, July and August. The fishing grounds off Iceland are divided into four areas and a pre-determined cod-cap set for each month in each of the areas. The fishery is an open-access fishery and fishing in each month and area is suspended once the cap is reached. Boats may only employ hand-line and can only fish for 14 h per day during Monday–Thursday. While popular in some quarters, the coastal fishery fits badly into the overall management system which has grown away from the derby-style fisheries of old.

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