

Regional Impact of the Individual Transferable Quotas in Iceland

BIRGIR RUNOLFSSON

The Icelandic economy is heavily dependent on fisheries: the export of fish products accounts for around 80 percent of the commodity exports in Iceland and 50 percent of all foreign exchange earnings. The fishing industry's direct contribution to GDP is about 17 percent, but the total contribution—direct plus indirect—may be as high as 45 percent of GDP. In other words, without the fisheries, Iceland's GDP would be only about 60 percent of current amount. The country's relative affluence is, therefore, mostly due to the biological productivity of its marine environment and the activity of its fishing industry. The size of the fishing industry relative to the whole economy means that any fisheries policy has far reaching implications. The fishing industry is a major determinant of personal incomes and income distribution and, in many parts of Iceland, the fishing industry is virtually the only basis for economic activity. Anything that affects the fishing industry, therefore, has a regional impact that often has very potent political repercussions. As a result, fisheries management is a major topic of public discussion and has great influence on the formulation of Iceland's economic and regional policy.

The purpose of this chapter is to examine the impact of fisheries management on Icelandic communities. For this examination, it is convenient to divide Iceland into 7 regions: Western, Western

Fjords, Northwestern, Northeastern, Eastern, Southern (including the Westman Islands) and Southwestern (combining Reykjavik and Reykjanes) (see figure 1 for a map showing these regions and important cities and towns.) The Southwestern region is almost completely urban; it holds about 65 percent of the total population of Iceland but only about 6 percent are involved in the fishing industry. The other regions are much less densely populated but the fishing industry in those areas employs from about 20 percent to 40 percent (in the Western Fjords) of the population.

An ITQ system has been in operation in the Icelandic demersal fisheries since 1984. In public and parliamentary discussions of the merits of the ITQ system in Iceland, some have claimed that it has the fault of undermining regional policy. This group argues that transferability of the quotas will lead to concentration of quota holdings in the urban Southwest region, and that this will harm the villages around the country that rely exclusively on the fisheries. The result will be increasing unemployment in those regions and migration to the Southwest.

In the course of this debate, various proposals to restrict the transferability of quotas have been made.¹ Some have even suggested that quotas be attached to certain regions and that transfers be restricted, while others have proposed giving local governments, town councils, or fishers' unions some veto power on transfers. The current Fisheries Management Act makes shares in the total allowable catch (TAC) transferable without any restrictions whatsoever. Interregional transfers of annual vessel quotas, however, are subject to some restrictions unless they are offsetting transfers of different species of equal value. Fishers' unions are to evaluate such interregional transfers of annual vessel quotas. Further, local governments have the right to

1 There were three debated questions at the initial allocation of quotas. (1) What were the base years for catch history? This was resolved by allowing vessels to adjust their quotas through an effort-restrictions option from 1985 to 1990. (2) Should entities other than vessels (e.g., processing plants and fishers) receive quota. The fact that a large part of the demersal catch was caught by vessels owned by firms with processing plants quickly made this question of no importance. (3) Should the government have charged the vessels for the initial allocation of quotas? From this has arisen the further question whether the government should charge the vessels "rent" for using the resource (see Arnason, et al. 1992). For arguments on the efficiency and justness of the initial allocation, see Gissurarson (1990), Arnason and Runolfsson (1991), and Runolfsson (1992).

Figure 1 Regions, cities and towns of Iceland



match any offer for annual vessel quotas if they wish to block the transfer of quota out of their regions. In practice, however, few interregional transfers are actually blocked.

Structure of the fishing industry

The harvesting and processing sectors of the Icelandic fishing industry have until recently been characterized by numerous, relatively small, firms. Frequently these firms exhibit a high degree of vertical integration through the harvesting and processing sectors but there was little horizontal integration. The typical firm in the fishing industry is based in one fishing town or village and operation across regions is rare, though on the increase. The firm operates one or several processing plants and sends out one or several fishing vessels that supply most of its wetfish needs. Independent vessels provide any additional fish needed, on the basis of implicit or explicit contracts, or through wetfish floor markets, where vessels and processors can sell and buy wetfish by auction.² The first

2 Some markets, such as the Sudurnes fish market in the Southwestern Region, rely less on auction floors and more on telecommunication. In such markets, a buyer can bid via computer and modem. Note also that the fish auctioned need not have been already caught.

three floor markets were established in 1987 and there are now 15 markets, at least one in every geographical region.³

Regional impact of ITQ management

The purpose of any fishery management system must be to increase efficiency and rents in the fishery. This will be accomplished through a smaller fishing fleet, less effort, and larger fish stocks resulting in increased TAC. A smaller fleet and decreased effort are likely to alter the structure of employment and regional development, since fewer vessels may mean fewer fishers, although the decrease in their number should be proportionally smaller. Fewer vessels and decreased effort will also affect the suppliers of the fishing industry, such as shipyards and gear makers. But fewer vessels and increased TAC will increase the catch per vessel. Fishery management should also work to increase the quality of the landed catch. These improvements should increase fishers' income, in total if not per capita.

Although the increased efficiencies of the fisheries through the ITQ system may decrease employment for fishers and for workers in industries that are suppliers for the fishing vessels, employment in other industries should increase. The increased rent in the fisheries and the consequent higher income of those in the industry should increase demand for other domestic services and industries. There is no reason to expect the net effect on total employment to be negative; the opposite is more likely.

Regional shares in quotas and catch

It is now over a decade since the introduction of the ITQ system in the Icelandic fisheries, and it is now possible to examine the impact of the system on regional development in Iceland.

In an ITQ system, the quotas are the key to receiving catch landings. Quota holdings decide how much catch will be landed in a village and, therefore, they determine the employment opportunities in the village's fishing sector. To estimate the impact of the ITQ system on regional development, we shall look at

3 This description applies to most of the demersal, crustacean, and shellfish fisheries, and, to a lesser extent, to the herring fisheries. Together these account for around 90 percent of the total value of the Icelandic fisheries. The reduction fisheries, based primarily on capelin and herring, are organized somewhat differently. See Arnason (1995a; 1996a) for further details on the organization of the fishing industry.

changes in regional quota holdings since the adoption of the ITQ system.

The initial allocation of quotas was based on vessel catch history from 1980 to 1983, and this allocation mirrors the regional distribution of the fishing industry in terms of catches in those years. Since the initial allocation of quotas, subsequent allocation may have changed for any of four reasons. First, it may have changed because of the catch history of vessels in the period from 1985 to 1990, when vessels were allowed to opt for effort quota. Second, it may have changed as a result of a larger part of the fishing fleet coming under the ITQ system after the effort quota option and small vessel exemption (6 to 10 GRT) were abolished in 1991. Third, it may have changed because of transfers of TAC shares between vessels. Fourth, it may have changed with the sale of ITQ vessels from one region to another. Only the third and fourth changes of quota allocation are the result of the ITQ system.

Table 1 lists each region's share of allocated quotas, in terms of cod equivalents.⁴ As table 1 shows, the changes in quota holdings for the regions are, for the most part, insignificant. The most significant change is the gain in the Northeast region and the loss in the Southwest.

If quota holdings define the opportunities that villages have for job creation in the fishing industry, the actual catch landings in the village determine the realized number of jobs. Quota holdings and landed catch do not necessarily go together. Vessel owners may choose to land the vessel's catch in another village, region or to export the catch unprocessed. The data on the catch landings from the demersal fisheries are, therefore, important.

Table 2 lists regional landings of the ITQ species from the demersal fisheries. The five species included are cod, haddock, saithe, redfish, and Greenland halibut, and are shown in cod equivalents. The table shows that the regional patterns of demersal landings

4 The weight for the different species, except cod, changes slightly each year. The Ministry of Fisheries puts out new regulations for each fishing year, announcing the TAC for various species, cod equivalent values, and so forth. By changing the cod-equivalent values for the different species, they approximate more closely the actual market value of the catches of these species. Changes in cod-equivalent values explain some of the variations in quota holdings and groundfish landings listed in tables 6 and 7. These changes in cod-equivalent values are insignificant between single years, except for the fishing seasons 1995/96 and 1996/97.

Table 1 Quota holdings for each region from 1984 to 1996
(cod equivalents, registered port of vessel)

	South- west	West	Western Fjords	North- west	Northeast	East	South
1984	29.7%	8.9%	13.6%	6.1%	14.9%	13.2%	13.5%
1985	29.3%	9.0%	13.7%	6.2%	15.1%	13.3%	13.4%
1986	27.8%	9.7%	13.9%	6.3%	14.8%	13.7%	13.8%
1987	24.9%	9.9%	14.1%	6.9%	16.9%	13.7%	13.6%
1988	24.6%	9.6%	14.2%	7.4%	16.7%	13.5%	14.0%
1989	22.8%	9.3%	14.6%	7.9%	17.6%	13.2%	14.7%
1990	24.1%	9.0%	14.0%	7.6%	17.1%	12.9%	15.2%
1991	23.7%	9.4%	13.9%	7.9%	17.7%	12.5%	14.8%
1991/92	24.3%	9.3%	13.8%	7.2%	18.4%	12.6%	14.4%
1992/93	24.5%	10.1%	13.5%	6.6%	18.2%	13.2%	13.9%
1993/94	24.7%	10.0%	12.2%	6.9%	18.4%	13.4%	14.5%
1994/95	25.0%	10.0%	11.9%	7.0%	18.8%	12.4%	15.0%
1995/96	26.1%	10.2%	11.5%	7.4%	19.9%	11.4%	13.5%
Average	25.5%	9.6%	13.4%	7.0%	17.3%	13.0%	14.2%

Source: Fisheries Directorate, Arnason (1992).

have a much higher volatility than quota holdings. The Northeast shows an increased share of the landings, as it did in the quota holding. The Southwest increased its share of landings substantially despite its smaller share of quota holdings. This must be attributed to the introduction of floor markets as the first three floor markets—the largest in the country—were established there. They handled close to 50 percent of the total volume of all floor markets in 1994. Since their introduction in 1987, they have grown so that in 1994 they handled about 37 percent of all groundfish landings intended for the domestic processing plants.

Another significant change is the export of unprocessed groundfish—especially the export in cargo containers—that started in the 1980s. Export of unprocessed groundfish accounted for about 6 percent of the volume of demersal catches (ITQ species) in 1983, about 17 percent in 1990 and 10 percent in 1994. In cod equivalents, the export in 1994 accounted for almost 9 per-

Table 2 Share in groundfish landings for each region from 1983 to 1996 (cod equivalents for cod, haddock, saithe, redfish and Greenland halibut) as a fraction of groundfish landings for domestic processing

	South-west	West	Western Fjords	North-west	Northeast	East	South
1983	27.9%	11.2%	13.4%	5.3%	14.3%	13.7%	14.2%
1984	26.5%	10.9%	15.3%	6.1%	14.6%	13.0%	13.6%
1985	25.3%	11.0%	13.6%	6.8%	15.9%	14.3%	13.1%
1986	25.2%	11.8%	13.2%	6.8%	16.8%	15.2%	11.0%
1987	25.4%	12.0%	12.7%	7.7%	17.4%	15.1%	9.7%
1988	25.8%	10.2%	13.8%	7.3%	19.5%	14.1%	9.3%
1989	27.3%	10.4%	13.6%	6.5%	19.2%	13.0%	10.0%
1990	29.7%	9.4%	12.4%	7.6%	20.1%	11.2%	9.6%
1991	30.4%	8.9%	13.0%	7.8%	20.0%	11.3%	8.6%
1992	30.6%	7.7%	13.2%	7.9%	20.7%	11.6%	8.3%
1993	30.6%	8.8%	12.7%	7.8%	21.8%	10.1%	8.2%
1994	34.3%	7.9%	11.8%	6.4%	20.3%	10.7%	8.7%
1995	34.2%	10.3%	12.4%	4.4%	17.2%	12.5%	8.9%
1996	27.3%	10.4%	13.6%	6.5%	19.2%	13.0%	10.0%
Average	28.6%	10.1%	13.2%	6.8%	18.4%	12.8%	10.2%

Source: Fisheries Directorate and Arnason (1992).

cent of demersal ITQ catches. The Southern region has traditionally been the leading exporter of unprocessed fish, and in 1994 they exported almost 20 percent of their groundfish ITQ catches unprocessed. The Northwest exported close to 17 percent, but all other regions exported less than 9 percent.

Yet another explanation for the divergence between quota holdings and catch landings is found in the increased number of freezer trawlers. In 1996, there were 50 such processing vessels in Iceland, but only three in 1983. Of those, 15 were registered in the Southwest, 14 in the Northeast, 6 in the Western Fjords, 5 in the Northwest, 4 in the South, 4 in the East, and only two in the West.

When the ITQ system was adopted in 1984, small vessels were excluded from the system. From 1984 to 1988, all vessels under

12 GRT were excluded; from 1989 to 1991, vessels under 10 GRT were excluded; from 1991, only vessels under 6 GRT were excluded. These small vessels were allowed to choose between ITQs and effort-days restrictions. The latter option restricts the number of fishing days and limits the vessels to hook and line gear, and is generally referred to as the hook licence. A decreasing majority of these small vessels has opted for the hook licence since 1991, and from 1990 to 1994, the hook-licence vessels more than doubled their catch volume from less than 20,000 gross metric tonnes (GMT) to over 40,000 GMT. Table 8 shows the catch by the hook-licence vessels from 1991 to 1995 and the regional distribution of that catch. As can be seen in the table, the regions have had mixed success in holding their share in this catch.

Table 3 Landings of hook-licence catch by region from 1991 to 1995

	1991	1992	1993	1994	1995
Southwest	8,887	12,465	8,649	14,272	14,743
West	2,426	2,328	2,784	2,613	2,509
Western fjords	3,283	6,290	6,826	9,971	9,380
Northwest	1,144	1,660	1,663	2,029	1,560
Northeast	4,176	3,925	4,417	6,566	5,888
East	2,333	2,865	2,501	4,409	6,773
South	1,183	790	709	1,082	1,529
Abroad	573	164	249	144	61
Total	24,005	30,478	27,791	41,086	42,445
Number of vessels	912	980	962	990	1,004

Source: Fisheries Directorate

Despite initial claims that the ITQs would result not only in a decrease in the number of fishing vessels but also in a decrease in employment for fishers, the opposite has actually occurred. In 1983, there were about 5,800 fishers employed in the harvesting sector; in 1990, there were 7,000 and, in 1995, about 6,800.⁵ This increase is to be explained mainly by the increase in the number of freezer-trawlers but also by the increase in the number of small vessels. There has, on the other hand, been a decrease in process-

5 Employment, number of man years (National Economic Institute 1997).

ing employment from 10,200 in 1983 to less than 7,000 in 1993. This decrease is in some part explained by the increased number of freezer-tractlers, but mainly by the smaller demersal catches and the increased exports of fresh fish. Despite the increased number of fishers, the catch value per fisherman has increased by over 20 percent since 1990 (Arnason 1996b).

Regional transfers of quotas

A substantial portion of annual vessel quotas is traded every year. A number of TAC shares traded each year is smaller, but these exchanges are very significant as they result in fewer vessels in the fishery. The transfers of permanent quotas (TAC shares) of demersal species⁶ between regions⁷ during the period from 1991 to 1994/95, expressed in cod equivalents and as fractions of the total allocated demersal quotas for each year were: 1991—7.3 percent; 1991/92—10.1 percent; 1992/93—14.1 percent; 1993/94—7.6 percent; 1994/95—15.8 percent (National Economic Institute 1997). Despite these high percentages, net transfers to or from any region are smaller, about one percent at most.⁸

Quota holdings of the largest harvesting firms

Shortly after the introduction of the ITQ system in the demersal fisheries, there was discussion of the potential for concentration of quotas. If TAC shares were transferable, it was argued, the bigger and richer harvesting firms would in a short time buy the quotas from the smaller firms. It was even suggested that, if permanent quotas were made transferable, a limit should be set on the quota holdings of any one firm.⁹

6 There have also been substantial transfers of other quota species, e.g., herring, capelin, shrimp and lobster.

7 Transfer of permanent TAC shares between vessels with different owners has been allowed since 1988.

8 Quota holdings by foreigners is not an issue in Iceland, since foreigners are not allowed to own fishing vessels in Iceland. Foreign investment in Icelandic fish processing firms is also restricted. Icelanders have nevertheless invested in harvesting and processing firms abroad.

9 The *Fisheries Management Act of 1990* has a clause setting a limit on the quota holdings of any single vessel; it states that no vessel can have a larger TAC share than it could catch within the fishing year. This clause was added to counter circumvention of the Act by the wetfish floor markets, which had been buying TAC shares and registering them on a single small vessel to increase market activity by providing quotas for vessels selling in the market. In January 1997, the Minister of Fisheries appointed a workgroup to address the issue of whether an upper limit should be set on the ITQ holdings of individual firms.

Table 4 Quota holdings in the demersal fisheries of the 11 largest harvesting firms^A

	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1996/97 ^B
Grandi Ltd. (SW)	4.34%	4.93%	4.89%	5.06%	6.12%	5.75%	4.68%
Utgerdarfelag Akureyringa (NE)	4.02%	4.60%	4.64%	4.97%	5.41%	5.41%	4.71%
Samherji Ltd. (NE)	3.20%	3.40%	3.38%	3.45%	3.60%	4.18%	3.71%
Skagfirdingur Ltd. (NW)	1.47%	1.46%	1.66%	2.21%	2.93%	3.34%	2.93%
Haraldur Bodvarsson Ltd. (W)	2.22%	2.30%	2.27%	2.30%	2.56%	3.32%	2.84%
Skagstrendingur Ltd. (NW)	2.24%	2.32%	2.29%	2.25%	2.23%	2.19%	2.11%
Vinnslustodin Ltd. (S)	2.48%	1.96%	2.95%	2.53%	2.19%	2.04%	2.13%
Ogurvik Ltd. (SW)	1.60%	1.67%	1.76%	1.89%	2.13%	2.08%	1.65%
Sildarvinnslan Ltd. (E)			1.49%	1.84%	1.81%	1.73%	1.74%
Saeberg Ltd. (NE)	1.68%	1.67%	1.64%	1.66%	1.73%	1.71%	1.59%
Midnes Ltd. (SW)	1.31%	1.60%	1.65%	1.68%	1.78%	1.61%	1.44%
Total	24.56%	25.91%	28.62%	29.84%	32.49%	33.36%	29.53%

Source: Kvotabokin 1996/97.

^A Shares of total cod equivalent values at the start of each year.

^B TAC share using cod equivalent values from 1994/95. These values changed very little during the five year period, except in 1995/96

Table 4 shows the quota holdings of the 11 largest firms in the demersal fisheries. Together they hold about 33 percent (30 percent if we use constant cod-equivalent values) of the demersal quotas and a little less than 32 percent of all ITQs.¹⁰ Only 5 of

¹⁰ The 50 largest harvesting firms held roughly 60 percent of all ITQs at the start of the 1996/97 fishing year (Arason 1996: 120–22).

these eleven firms have increased their share to any extent in the last 5 years, and one firm has lost some share in the same period. In total these firms have increased their share by some 8 percentage points (5 percentage points in constant cod-equivalent values); about 1.5 percentage points of this increase are explained by Sildarvinnslan Ltd. joining the ten largest harvesting firms.

Table 5 Distribution of the top 50 percent of stock in the 11 largest demersal harvesting firms in 1994

	1993/94 ^A	Stock-holders	Institutional ^B	Other Corporations	Individuals
Grandi Ltd. (SW)	4.89%	700	0.9%	91.0%	0.0%
Utgerðarfélag Akureyringa (NE)	4.64%	1804	100.0%	0.0%	0.0%
Samherji Ltd. (NE)	3.38%	7	0.0%	0.0%	100.0%
Skagfirdingur Ltd. (NW)	1.66%	124	31.0%	69.0%	0.0%
Haraldur Bodvarsson Ltd. (W)	2.27%	634	41.0%	0.0%	59.0%
Skagstrendingur Ltd. (NW)	2.29%	507	66.0%	24.0%	10.0%
Vinnslustodin Ltd. (S)	2.95%	183	72.0%	28.0%	0.0%
Ogurvik Ltd. (SW)	1.76%	7	0.0%	0.0%	100.0%
Sildarvinnslan Ltd. (E)	1.49%	311	100.0%	0.0%	0.0%
Saeberg Ltd. (NE)	1.64%	8	0.0%	50.0%	50.0%
Midnes Ltd. (SW)	1.65%	4	0.0%	0.0%	100.0%
Total	28.62%	4289			

Source: Herbertsson and Bardarson (1995).

^A Quota holdings in the demersal fisheries in 1993/94; see table 4. Source: Kvotabokin 1996/97.

^B Under this heading are municipalities, pension funds, stock funds, etc.

That the 11 largest harvesting firms hold roughly 33 percent of all demersal quotas may be seen as a sign of concentration, especially considering that these same firms have increased their share by more than 20 percent in only 5 years.¹¹ But looking only at the number of harvesting firms and their quota holdings can be misleading. Consider the number of shareholders that hold stock in these harvesting firms, since these shareholders are the real owners of the harvesting rights. Table 5 shows how the top 50 percent of stocks are distributed in the eleven largest harvesting firms at the end of 1994. The number of stockholders in these corporations is well over 4,000, so that the percentage of quotas held by these firms is not a sign of concentration.

Further, the example of Samherji Ltd. counters the argument that concentration within an ITQ system makes entry into the industry difficult. This firm, though founded in 1972, came under the current ownership only in 1983, when its only asset was one deep-sea trawler. Samherji Ltd. has since grown to be, in January 1997, the largest quota holder in Iceland and has also invested in other firms, domestic and foreign. Today, Samherji Ltd. and its subsidiaries operate 20 vessels from 4 countries, 2 shrimp processing plants, 2 reduction plants, 1 freezing plant, and a marketing office in England. When the company went public in April 1997, 6,700 parties bought stock.

Population growth and regional migration

Every government in Iceland since the early 1950s has had some policy on regional development. For the most part, these policies have not been articulated in detail but rather had a common emphasis on maintaining population in all regions of the island. This has been effected by supplying credit and grants to marginal areas, providing capital, for example, to harvesting firms in the various villages around the island.

After World War II, the government put the emphasis on providing credit to renew the deep-sea trawler fleet and the herring fleet (multipurpose). In the following years, capital was also provided for new demersal freezing plants and herring reduction plants around the island. In the late 1950s and early 1960s, another injection of capital was provided to renew the multipurpose vessel fleet and, in the 1970s, credit was offered to renew the

11 Of these 11 firms, 8 exhibit a high degree of vertical integration; i.e., they process almost all the catches of their vessels in their own plants.

deep-sea trawler fleet and to renew freezing plants and expand capacity. Within a decade the policy of “a new stern-trawler in every port” had delivered that—and a few more. By 1980, there were 83 deep-sea stern trawlers and still only 67 official landing ports, not all of which could dock these trawlers.

Despite the governments’s support for investment in renewing the fleet, in expanding processing capacity, and in improving docks, rural islanders chose the comforts of urban living. Table 6 shows an almost continuous increase in the proportion of the population settling in the urban Southwest. Only in the period from 1970 to 1980, during the rural investment boom, did the rural regions keep their share of the population increase, and when the credit flow stopped, the Southwest continued its gain.

Table 6 Population and population change from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population							
<i>Southwest</i>	47,460	70,648	98,417	119,822	135,000	161,182	174,231
<i>Other</i>	74,014	73,325	78,875	84,756	94,187	94,526	93,578
<i>Total</i>	121,474	143,973	177,292	204,578	229,187	255,708	267,809
Population share							
<i>Southwest</i>	39.1%	49.1%	55.5%	58.6%	58.9%	63.0%	65.1%
<i>Other</i>	60.9%	50.9%	44.5%	41.4%	41.1%	37.0%	34.9%
Population index							
<i>Southwest</i>	1.00	1.49	2.07	2.52	2.84	3.40	3.67
<i>Other</i>	1.00	0.99	1.07	1.15	1.27	1.28	1.26
<i>Total</i>	1.00	1.19	1.46	1.68	1.89	2.11	2.20
	1940–50	1950–60	1960–70	1970–80	1980–90	1990–95	1940–95
Population change							
<i>Southwest</i>	48.9%	39.3%	21.7%	12.7%	19.4%	8.1%	267.1%
<i>Other</i>	–0.9%	7.6%	7.5%	11.1%	0.4%	–1.0%	26.4%

Source: Bureau of Statistics.

Development in the each of the regions

Above we have been describing regional development in Iceland by comparing the Southwestern region with the other regions as a whole. Since the other regions are, of course, not identical and share common characteristics only to some degree—urbanization and the structure of local industry, for example, are different in each—a brief description of each particular region follows.

Western Region

The Western region has slightly more than 14,000 inhabitants and is the fourth most (and least) populous region in Iceland (see table 7). The region includes Akranes, the seventh largest town in Iceland, with a population of 5,100. Akranes is the base for Iceland's fifth largest harvesting firm, Haraldur Bodvarsson Ltd. A little more than 25 percent of the population is employed in fishing and fish processing; about 15 percent of the inhabitants engage in agriculture and another 15 percent in heavy industry. The other 40 percent of the population are employed in various trades, transportation, service industries and the public service.

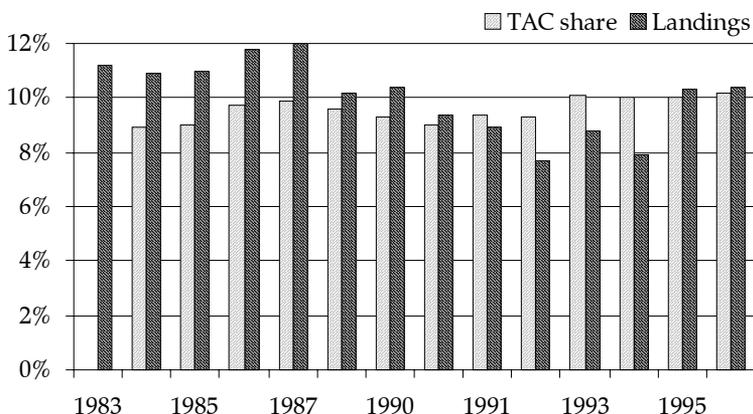
Table 7 Population and population change in the Western region from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population	9,936	9,975	11,973	13,205	14,884	14,537	14,154
Share	8.2%	6.9%	6.8%	6.5%	6.5%	5.7%	5.3%
	1940–50	1950–60	1960–70	1970–80	1980–90	1990–95	1940–95
Change	0.4%	20.0%	10.3%	12.7%	-2.3%	-2.6%	42.5%

Source: Bureau of Statistics.

The Western region has increased its share of the TAC for various species by more than one percentage point since 1984; its share of demersal landings has decreased by less than one percentage point in this period (see figure 2). This decrease can be explained by the fact that the fishing grounds off this region have not been productive in recent years, and vessels from elsewhere no longer fish there. In 1994, the region's vessels exported less than 6 percent of their demersal catches unprocessed.

Figure 2 Western region's share in demersal TAC and landings



Source: Fisheries Directorate.

Western Fjords Region

The Western Fjords region is the least populous in Iceland, having only 9,000 inhabitants; it has lost close to one-third of its population since 1940 (see table 8). More than 33 percent of the inhabitants reside in the town of Isafjordur. The Western fjords are heavily dependent upon the fisheries and over 40 percent of the inhabitants are employed in fishing or fish processing. Less than 10 percent are engaged in agriculture, and the remaining 40 percent of the population are employed in the service industry, public service and transportation.

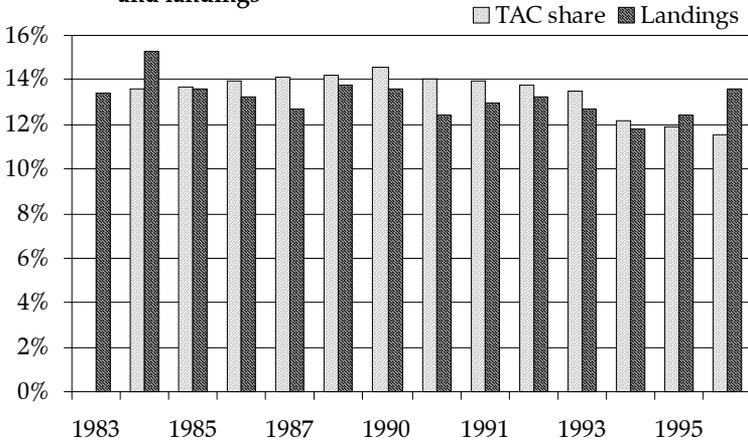
Table 8 Population and population change in the Western Fjords region from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population	12,953	11,166	10,507	10,050	10,479	9,798	9,018
Share	10.7%	7.8%	5.9%	4.9%	4.6%	3.8%	3.4%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	-13.8%	-5.9%	-4.3%	4.3%	-6.5%	-8.0%	-30.4%

Source: Bureau of Statistics.

The region has lost about two percentage points of the TAC shares since 1984, and its share of demersal landings has decreased by about one percentage point in the period (see figure 3). In 1994, the region's vessels exported about 5 percent of their demersal catches unprocessed.

Figure 3 Western Fjord region's share in demersal TAC and landings



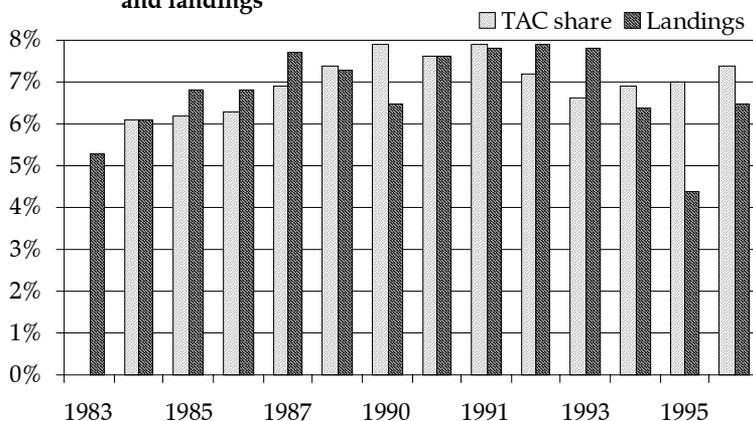
Source: Fisheries Directorate.

Northwestern Region

The Northwestern region is the second least populous region in Iceland, and has only 10,200 inhabitants. Since 1940, the region has lost almost three percent of its residents (see table 9). Fishing and fish processing employ just over 20 percent of the population, and agriculture employs a similar percentage. Saudarkrokur, the most populous town in the region, is home to Iceland's fourth largest fish-harvesting firm, Skagfirdingur Ltd., and the nearby town of Skagastrom is home to the sixth largest, Skagstrendingur Ltd.

The Northwestern region has increased its share of the TAC for various species by more than one percentage point since 1984. Its share of demersal landings has decreased by a little less than one percentage point in the period (see figure 4). This decrease can be explained by export of unprocessed fish; in 1994, for instance, the region's vessels exported almost 17 percent of their demersal catches unprocessed.

Figure 4 Northwestern region's share in demersal TAC and landings



Source: Fisheries Directorate.

Table 9 Population and population change in the Northwestern region from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population	10,496	10,264	10,241	9,909	10,631	10,446	10,208
Share	8.6%	7.1%	5.8%	4.8%	4.6%	4.1%	3.8%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	-2.2%	-0.2%	-3.2%	7.3%	-1.7%	-2.3%	-2.7%

Source: Bureau of Statistics.

Northeastern Region

The Northeastern region is the second most populous in Iceland, having almost 26,700 inhabitants (see table 10). Close to 60 percent of the region's population reside in and around Iceland's fourth largest city, Akureyri. Two of Iceland's largest fish-harvesting firms, Samherji Ltd., and Utgerðarfélag Akureyringa Ltd., are based in Akureyri, and Saeberg Ltd. is based in Olafsfjordur. About 20 percent of the employment in the region is in fishing and fish processing. Less than 10 percent of the working population are engaged in agriculture, and about 15 percent are engaged in various small-scale industries.

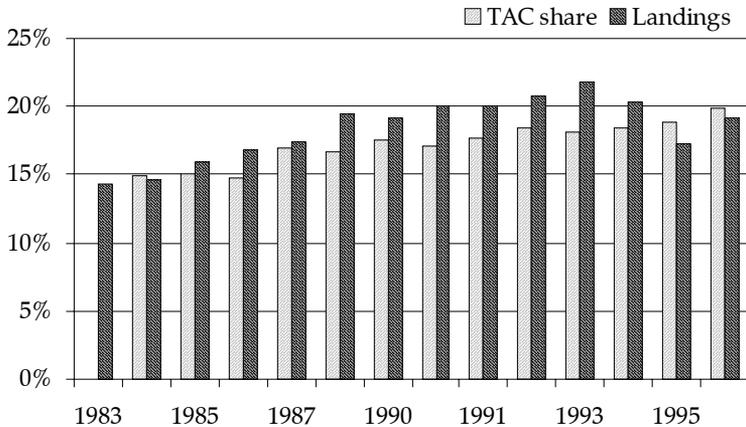
Table 10 Population and population change in the Northeastern region from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population	16,910	18,368	19,769	22,225	25,700	26,127	26,664
Share	13.9%	12.8%	11.2%	10.9%	11.2%	10.2%	10.0%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	8.6%	7.6%	12.4%	15.6%	1.7%	2.1%	57.7%

Source: Bureau of Statistics.

The region has increased its TAC share by about 5 percentage points since 1984, far more than any other region. Its share of demersal landings has also increased by about three percentage points (see figure 5). In 1994, the region's vessels exported only about 3.5 percent of their demersal catches unprocessed, less than any other region.

Figure 5 Northeastern region's share in demersal TAC and landings



Source: Fisheries Directorate

Eastern Region

The Eastern region is the third least populous region in Iceland, having a little less than 13,000 inhabitants (see table 11). About

Table 11 Population and population change in the Eastern region from 1940 to 1995

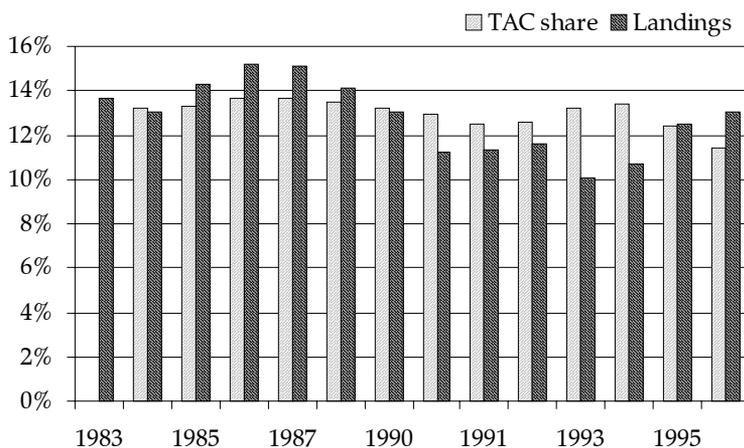
	1940	1950	1960	1970	1980	1990	1995
Population	10,123	9,705	10,367	11,315	12,856	13,216	12,780
Share	8.3%	6.7%	5.8%	5.5%	5.6%	5.2%	4.8%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	-4.1%	6.8%	9.1%	13.6%	2.8%	-3.3%	26.2%

Source: Bureau of Statistics.

33 percent of the population are employed in fishing and fish processing, and 10 percent are engaged in agriculture. The town of Neskaupstadur is home to Sildarvinnslan Ltd., the tenth largest harvester of fish in Iceland.

The Eastern region's share of the TAC for various species has decreased by a little more than one percentage point since 1984. Its share of demersal landings has also decreased by about one percentage point (see figure 6). In 1994, the region's vessels exported 8 percent of their demersal catches unprocessed.

Figure 6 The Eastern region's share in demersal TAC and landings



Source: Fisheries Directorate

Southern Region

The Southern region, with close to 21,000 inhabitants, is the third most populous region in Iceland (see table 12). The region includes the Westman Islands, which have a population of almost 5,000, and are almost exclusively dependent on the fisheries. The Westman Islands is the base for Vinnslustodin Ltd., the seventh largest harvesting firm in Iceland, and for many smaller fish harvesting and processing firms. In the region as a whole, however, only a little over 20 percent of the population is employed in fishing and fish processing. Another 20 percent are engaged in agriculture in this, the most important farming region of Iceland.

Table 12 Population and population change in the Southern Region from 1940 to 1995

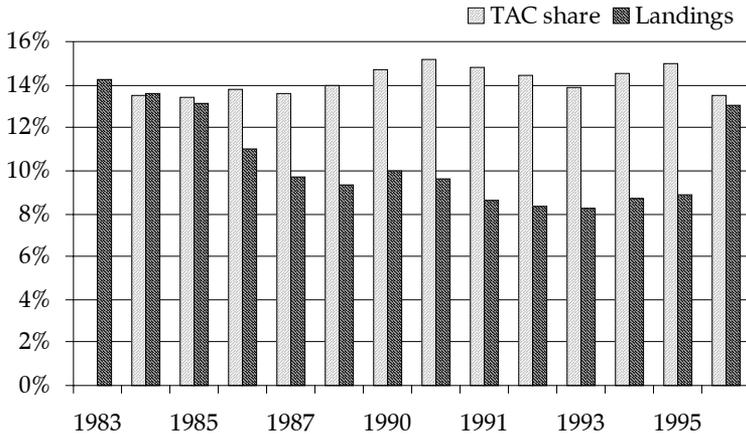
	1940	1950	1960	1970	1980	1990	1995
Population	13,596	13,847	16,018	18,052	19,637	20,402	20,754
Share	11.2%	9.6%	9.0%	8.8%	8.6%	8.0%	7.7%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	1.8%	15.7%	12.7%	8.8%	3.9%	1.7%	52.6%

Source: Bureau of Statistics.

Despite having the same share of the TAC for various species in 1995/96 as it had in 1984, the Southern region's share of demersal landings has decreased by about 5 percentage points in the period (see figure 7). Most of this difference between TAC shares and landings can be explained by the fact that this region has been foremost in exporting unprocessed fish. In 1994, the region's vessels exported about 20 percent of their demersal catches unprocessed. No other region exported as large a portion, and only the Northwestern region, which exported about 17 percent of its demersal catch unprocessed, approached this figure. From the mid-1980s, the export of unprocessed catches in cargo containers has become common, and these exports average a little over 10 percent of all demersal catches of the country's fishing fleet. A further explanation for the difference between TAC shares and landings in this region can be found in the rise of

wetfish floor markets in the Southwest in 1987 and, subsequently, in the Southern region.¹²

Figure 7 Southern region's share in demersal TAC and landings



Source: Fisheries Directorate

Southwestern Region

The Southwestern region is by far the most populous in Iceland. This region has close to 175,000 inhabitants (see table 13), and includes the capital city of Reykjavik, which has a population of over 104,000 in the core and an additional 54,000 in the surrounding suburbs. The capital-city area relies very little upon the fishing industry—only about three percent of the inhabitants are employed in fishing and fish processing, although the largest harvesting firm of recent years, Grandi Ltd., and also Ogurvik Ltd. are based there. In the Southwestern region as a whole, only a little over 6 percent are employed in fishing and fish processing. Compare this to the almost 20 percent working in the public service, the 20 percent

12 Both sellers and buyers at any particular floor market can come from any region, and there is no need to travel since most of the floor markets offer bidding through telecommunication. Further, some of the floor markets do not require the vessels to land the fish before a sale. The vessel captain can telephone the market, register his catch (or estimated catch), and announce at which port he will be arriving. The catch is then sold unseen to the buyers. This practice does not appear to create any problems since about one-fourth of the volume of the floor markets is sold this way.

working in the manufacturing and construction industries, and the more than 50 percent employed in the service industries. Agriculture is almost non-existent in this region.

Table 13 Population and population change in the Southwestern region from 1940 to 1995

	1940	1950	1960	1970	1980	1990	1995
Population	47,460	70,648	98,417	119,822	135,000	161,182	174,231
Share	39.1%	49.1%	55.5%	58.6%	58.9%	63.0%	65.1%
	1940-50	1950-60	1960-70	1970-80	1980-90	1990-95	1940-95
Change	48.9%	39.3%	21.7%	12.7%	19.4%	8.1%	267.1%

Source: Bureau of Statistics.

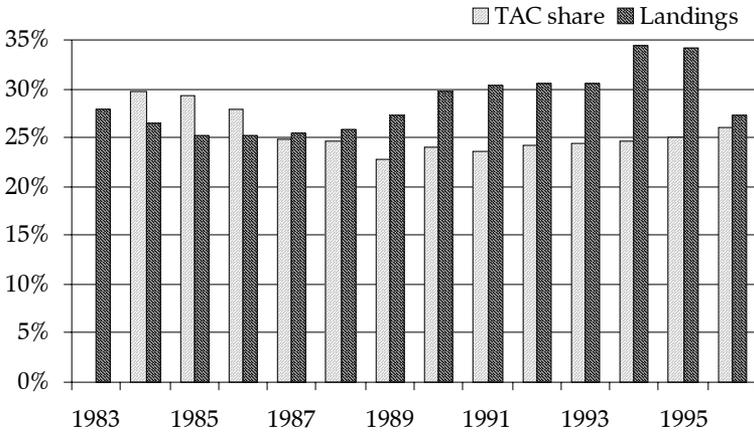
Since 1984, the Southwestern region has lost some of its share of the TAC for various species. Its share of demersal quotas has decreased by over 3 percentage points during the period since the inception of the ITQ system but, as figure 8 shows, this decrease took place during the first half of the period. Since 1990, however, its TAC shares have been increasing again. Landings of demersal catches, on the other hand, have risen by over 6 percentage points since 1983. Most of this difference between TAC shares and landings can be explained by the fact that three of the four largest wetfish floor markets are located in the region and they have attracted vessels from the other regions. This region also has the best and biggest ports.

Wetfish prices tend to be higher in this region because of the presence of the floor markets, but also because the region has several firms that specialize in exporting slightly processed and fresh-fish products by air freight. The only international airport in Iceland is located in the region. In 1994, the region's vessels exported close to 9 percent of their demersal catches unprocessed—about the average for Iceland.

Regional and Community Prospects

The verdict on the regional and social impact of the ITQ system must be favourable. Successive governments in Iceland have since the early 1950s attempted to support and expand employ-

Figure 8 Southwestern region's share in demersal TAC and landings



Source: Fisheries Directorate

ment opportunities outside of the Southwestern region. This policy has a record of failure, except during the 1970s, when government encouraged investment in new fishing vessels and processing plants and provided almost unlimited credit to the other regions. Migration to the urbanized Southwestern region halted, but resumed as soon as the credit flow stopped.

The continuous depopulation of the rural regions, which have lost population share and, in some cases, now have fewer people, cannot be attributed to the introduction of ITQs. There has been a trend towards depopulation throughout the century—continuous except for the brief period of the 1970s—and this trend is likely to continue. Migration from rural regions is not peculiar to Iceland and can be observed in any Western economy. The trend towards urbanization manifests the increasing orientation of these economies towards the service sector.

The ITQs have not resulted in a flow of quotas to the Southwest. In terms of TAC, the Southwestern region has actually lost over 3 percentage points (more than 10 percent of its 1984 quota holdings) of its TAC shares in the demersal fisheries to the other regions. The Northeastern region has gained 5 percentage points (a fourth of their current quota holdings) and the Western and Northwestern regions have gained slightly, while the Eastern

and Western Fjords regions have lost some. The Southwestern region holds about 66 percent of Iceland's population but has only 25 percent of the TAC shares in the demersal fisheries.

In terms of demersal landings for domestic processing plants (excluding unprocessed exports), the Southwestern region has gained considerably. Since 1983, the Southwestern region's share in the demersal landings has increased by almost 25 percent (roughly 6 percentage points). The Southwestern region's gain seems to be mainly at the expense of the Southern region, which has lost roughly 5 percentage points in the same period. This shift is explained by the increased catch volume that is handled by the wetfish floor market in the Southwestern region. These markets attract landings from the other regions, and especially from the Southern region, as it is located close to the Southwestern region. The Southern region also exports a large portion of its catches unprocessed.

The ITQ system has not, therefore, had any adverse regional impact in Iceland, and, on the contrary, has had a favourable impact in some regions. There is no reason to expect that the ITQs will, in the future, have negative regional effects and positive effects can be expected. With the better condition of the fish stocks today, TACs will increase in the future, and, indeed, for the 1996/97 fishing year, the TAC for cod has already been raised by some 20 percent.¹³ Increased quota holdings in the rural regions could produce increased landings and income, although whether that will materialize will depend on other variables, such as market prices for various fish products, the changing structure of the processing plant industry, and the increased share of the processing vessels.

Acknowledgments

I am indebted to Professor Ragnar Arnason for comments and suggestions, and to the staff at the Fisheries Directorate for statistics.

References

- Arason, Ari (1995). *Kvotabokin 95-96*. Reykjavik: Skerpla.
——— (1996). *Kvotabokin 96-97*. Reykjavik: Skerpla.
Arnason, Ragnar (1992). *Stjornkerfi fiskveiða: Aflamark og byggdathroun. Greinargerð fyrir nefnd um motun sjavarutvegsstefnu*, [mimeo]. Reykjavik
——— (1993). The Icelandic Individual Transferable Quota System: A Descriptive Account. *Marine Resource Economics* 8: 201–08.

13 This was the first increase in the TAC for cod in 12 years.

Regional Impact of ITQs in Iceland

- (1995). *The Icelandic Fisheries: Evolution and management of a fishing industry*. Oxford: Fishing News Books.
- (1996a). On the ITQ fisheries management system in Iceland. *Reviews in Fish Biology and Fisheries* 6: 63–90.
- (1996b). Property Rights as an Organizational Framework in Fisheries: The Case of Six Fishing Nations. In B.L. Crowley (ed), *Taking Ownership; Property Rights and Fishery Management on the Atlantic Coast* (Halifax: Atlantic Institute for Market Studies): 99–144.
- Arnason, R., G. Pálsson, and O. Jonsson (1992). *Stjorn fiskveiða og skipting fiskveiðiardisins*. Reykjavik: Sjarvautvegsstofnun og Haskoli Íslands.
- Arnason, R., and B. Runolfsson (1991). *Er kvotakerfid hagkvaemt?* Reykjavik: Stofnun Jóns Thorlákssonar.
- Bureau of Statistics (1991). *Landshagir 1991, Statistical Abstract of Iceland*.
- (1996). *Landshagir 1996, Statistical Yearbook of Iceland*.
- . *Hagtidindi*. Vols. 1991-1996
- Fisheries Association of Iceland. *Aegir*. Vols 1977-1997.
- . *Utvegur*. Vols. 1977-1995.
- Gissurarson, Hannes H. (1990). *Fiskistofnarnir við Ísland: Thjodareign eða rikiseign?* Reykjavik: Stofnun Jóns Thorlákssonar.
- Herbertsson, T.T., and Hermann Bardarson (1996). *Íslenska kvotakerfid: framtid og throun*. Unpublished manuscript. Institute of Economic Studies, University of Iceland.
- National Economic Institute (1996). *Atvinnuvegask* Reykjavik: National Economic Institute.
- National Economic Institute (1997). *Atvinnuvegask* Reykjavik: National Economic Institute.
- Runolfsson, Birgir (1992). Skipulag fiskveiða: Sereign, hagkvaemni og arðskopun. In Arnason, R., G. Pálsson, and O. Jonsson, *Stjorn fiskveiða og skipting fiskveiðiardisins* (Reykjavik: Sjarvautvegsstofnun og Haskoli Íslands, 1992): 31–52.

