

The
**Icelandic
Fisheries**
Sustainable
and Profitable

HANNES H. GISSURARSON



UNIVERSITY OF ICELAND PRESS

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Bók þessa má eigi afrita með neinum hætti, svo sem ljósmyndun, prentun, hljóðritun eða á annan sambærilegan hátt, að hluta eða í heild, án skriflegs leyfis höfundar. Þó má birta tilvitnanir í ritdómum um bókina.

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Introduction

IN the autumn of 1980, while still a student of history and philosophy at the University of Iceland, I was invited to attend a conference at Thingvellir, the magnificent site of the Parliament of the ancient Icelandic Commonwealth. The conference was on what Iceland would be like in 2000, a year then rather distant on the horizon. Some of the lecturers asserted that capitalism was doomed, not least because of its inability to cope with environmental problems such as overfishing in Icelandic waters. From my reading of Friedrich von Hayek and other Austrian economists, I had concluded that the over-utilisation of a natural resource was usually created by the lack of property rights to the resource. I therefore, in the general discussion at the conference, innocently suggested that the problem should be solved by defining property rights, either to the fishing grounds themselves or to the fish stocks catchable within them. This suggestion was met with derision, and on 14 November one conference participant, the editor of the socialist organ, *Thjodviljinn*, even wrote of my absurd proposals in his newspaper: “He had found a solution to the problem of utilising fishing grounds. It was either to entrust the fisheries to a public company which would charge an admission fee to them, or to hand over to fishing firms the full ownership of the fishing grounds previously held in common.”

When I moved to Oxford a year later, in the autumn of 1981, to do postgraduate work in political philosophy, I found time

to study the major contributions to the economics of fisheries, including the important papers by Jens Warming (1911), H. S. Gordon (1954) and Anthony Scott (1955). Subsequently, in April 1983 I contributed a short article on the matter to the *Journal of Economic Affairs*, published by the Institute of Economic Affairs in London. I distinguished between four possible solutions to the problem of overfishing: *centralised socialism*, where government owned and managed the fish stocks; *market socialism*, where government owned the resource, but charged individual firms for fishing rights; *people's capitalism*, where the possible rent from the fisheries was distributed directly to the population at large; and *private property capitalism*, where “the traditional and existing fishing rights are recognised as property rights and made marketable”. I continued: “This would mean that the initial allocation of property rights would be the share in the catch: a company which had caught 5% of the total amount of cod caught in year zero would gain a title to 5% of the amount agreed upon in the future (by the title-holders in concert with and, presumably, on the advice of the experts); a company which had caught 10% of the total amount of herring caught would have a similar title, and so on.” In my article, I expressed a preference for this solution. “One advantage is that it is not as artificial as the second and third. The market is not constructed. It is developed out of existing institutions. It simply consists in handing over responsibility to the fishermen themselves, thus directing their interest to the preservation and, it is to be hoped, to the multiplication of the stock. The fishermen would not be ‘free riders’ any more; they would be owners.”

After completing my work at Oxford and taking up a position as Professor of Political Philosophy at the University of Iceland,

I wrote two short books on the problem of overfishing, one in Icelandic (1990) and one in English (2000); I also occasionally contributed papers in English to conferences, journals and books on the problem of overfishing, four of which (1999, 2003, 2005 and 2008) are reprinted here on the initiative of some of my colleagues. In a process of trial and error rather than by design, the development of the Icelandic system of individual transferable quotas in the demersal fisheries went largely along the lines envisaged in my 1983 article, while such a system had already then to some extent emerged in the pelagic fisheries. The system was made comprehensive in 1990, and has been remarkably successful: The Icelandic fisheries are both sustainable and profitable. Indeed, so profitable have they become that there has been immense political pressure to impose special, heavy taxation on them; this was actually done in 2009–2013, in the midst of an economic crisis, even if it has since been abandoned (while a moderate surcharge on fishing firms remains).

In the course of time, I have however come to see three important points more clearly than when in 1980 I initially suggested allocating private use rights to fishing firms in order to solve the problem of overfishing. While these three points are certainly made in the following papers, I should like here to emphasise them. First, overfishing is not a market failure: it is a government failure because it occurs if and when government neglects to do its duty of defining and developing rights to enable individuals to pursue their aims without transgressing on other people's legitimate spheres of activity. Overfishing is a case of harmful economic effects (or an 'externality'), just like a traffic jam. In the second place, the move from open access to exclusive individual rights should, if possible, be Pareto-

optimal, which means that at least some, if not all, would gain from it, while nobody would lose. The only Pareto-optimal way of introducing fishing rights is by allocating them to the existing fishermen—or more accurately, owners of fishing capital—on the basis of catch history. This is indeed the reason that in almost all instances where a system of individual transferable quotas has been adopted it has been on the basis of catch history (sometimes called grandfathering). Thirdly, the only right which others are deprived of by enclosing those commons, the fishing grounds, is really the right to harvest fish at zero profit which would be the inevitable end result for any additional fisherman under open access, as the pioneers of fisheries economics, Warming, Gordon and Scott, demonstrated. This right is, by definition, worth nothing. (It is, in the simple, but plausible and generally accepted model of open-access fisheries, the right of the 16th fisherman to enter, as illustrated in Figure 1 on page 72.) Thus, the Lockean proviso for acquiring private property rights in the commons—that others than the new owners are left in a position at least as good as they occupied before—is met. Or to put it differently, the enclosure of those commons has no losers, only gainers: it is a positive-sum game.

Hannes H. Gissurarson.

Agreeing on the Rules

RULES are needed because without them life would be solitary, poor, nasty, brutish, and short (Hobbes, 1651/1983, Ch. 13). Paradoxically, we have to be bound by rules, if we are to be free. A clear example is the problem of harmful effects of economic activity, or externalities. Rules, in the form of assignment of individual rights to use scarce resources and corresponding obligations concerning their use, typically emerge to enable us to keep harmful effects of economic activity to a tolerable minimum (Demsetz, 1967). In this paper, I point out that the well-known problem of the fisheries—unrestricted access, leading to a much greater fishing effort than would be optimal—has to be regarded as an instance of harmful effects. I shall argue that this problem has to be solved by the development of, and the agreement on, a proper set of rules to guide decision-makers in the fisheries, not by designing ‘correct’ government policies. In other words, the fisheries do not have to be managed properly: what has to be found, rather, and agreed on, is a set of rules whereby they can manage themselves, like most industries in a free market order. With a few exceptions (Tullock, 1961; Arnason, 1990), my approach is not widely shared by economists who have analysed the fisheries. They have tended to look at the fisheries from above, so to speak, to point out problems, work out the mathematical formulae describing their solutions and then rely on government to implement the outcomes. Such an approach has turned out to

be unfruitful. We need not only formal criteria for the optimal use of resources like fish stocks, but also an understanding of the interplay of individual decision-makers in the fisheries and the rules under which they operate, an understanding provided by the new discipline of constitutional economics, as I shall argue (Buchanan, 1987). Who would have an interest in changing the arrangements under which possible income is wasted in excessive effort? Who would have the ability and interest in acquiring the vast amount of data needed to attain the optimal fishing effort? And who would have the interest and information necessary to operate the system in the manner required?

The Problem of the Fisheries

A well-known example of the harmful effects of economic activity is the tale of two roads, as told by Professor A. C. Pigou (1912, 163; 1920, 194). The two roads connected the same two cities. One of the roads was quite narrow, but much better than the other one which was barely usable; the latter road was however so wide that it could accommodate all the traffic (solely commercial) between the two cities. It is easy to see that under these conditions traffic would be misallocated between the two roads. There would be more traffic on the better and narrow road than would be optimal, and less traffic on the worse one. Truckdrivers would move from the worse to the better road until average costs became equal on both roads, while what they ought to do would be to move until marginal costs became equal. The truckdrivers would not allow for the better quality of the narrow road which made it a scarce good. Because access was unrestricted, they would regard it as a free good. The 'rent' which could be derived from its

superior quality would be dissipated in the form of congestion. By moving in great numbers to the better road and causing congestion, the truckdrivers would be harming one another, but they would not take this harm to others into account in their individual decisions. Since marginal costs were unequal on the two roads, there was room for improvement. Pigou's idea was that government should charge a toll for the use of the narrow road reflecting its superior quality, or scarcity. If the toll was equal to the difference between the marginal private cost of using the narrow road, and the marginal 'social' cost, namely the harm or cost to others of using the road, then the allocation of traffic between the two roads would become optimal.

However, Professor Frank Knight pointed out that direct government action was not necessary in this case (Knight, 1924, 163–4). Pigou had assumed that the better road was not subject to private ownership. (The worse road can be regarded as a free or non-scarce good for our purposes.) If somebody owned the better road, he would hardly need government assistance to charge the appropriate fee or toll for its use. The optimal allocation of traffic between the two roads would be brought about by market transactions, in the manner usual in a free market order. The owner would capture the rent which could be derived from the superior road, and the truckdrivers, in deciding whether to use it would take into account all the costs of using it. Thus the use of the superior road would have no harmful effects, as with unrestricted access. One of Knight's students, Professor J. M. Buchanan, later observed that Knight's point was only valid if there was competition among the providers of roads (Buchanan, 1956). If the owner of the better road enjoyed a monopoly, the toll he would charge would be too high. Over-utilisation because of unrestricted

access would then be replaced by under-utilisation because of monopoly pricing. Truckdrivers would not be harming one another by causing congestion, whereas the owner of the road would be harming truckdrivers. Be that as it may, Pigou's and Knight's different responses to the tale of two roads well illustrate two different ways of thinking about harmful effects: Some economists advocate Pigovian taxes or other kinds of government intervention to correct situations which seem to need some improvements; others search for rules under which the individuals affected can sort out their differences by reciprocal actions or transactions (Coase, 1960).

The problem of the fisheries is quite similar to that of the two roads (Gordon, 1954). Compare two of many alternative uses of capital in a given country. One is to operate aluminium smelters, the other to harvest the stock of cod in the territorial waters of the country where the stock is huge and relatively easy to harvest. Now assume that the aluminium industry is marginal, which means that the income derived from it is the same as could be earned on average in other occupations. There is no rent to be derived from the production of aluminium, and average and marginal revenue is the same. Also assume (less plausibly) that capital can be used interchangeably in the aluminium industry and the cod fishery. By the same reasoning as in the tale of two roads we see that capital will move to the cod fishery until average net revenue there will be equal to that in the aluminium industry (and in other occupations), whereas the optimal fishing effort would be where marginal revenue in the fishery would be equal to marginal revenue elsewhere. Capital will be misallocated. Too much of it will be employed in the cod fishery compared to the aluminium industry and other industries. The rent which could be derived from the

stock of cod will over time be partly or wholly dissipated in excessive fishing effort.

The analysis needs qualification because capital is not as easily movable from the aluminium industry to the cod fishery in the short run as it will be in the long run (Scott, 1955). Over one fishing season, labour and capital have to be regarded as fixed. Some quasi-rent will therefore be derived from the harvesting of cod in the short run; the fishing firms will only increase their efforts to the level at which marginal cost will be equal to price. But in the long run the fishery will be inefficient. The reason is that the owners of fishing vessels, in making decisions about effort, will not fully take into account the costs that they impose on one another by using the resource. They will not plan their operations in such a way that their current income from the resource, discounted to the future, will be maximized. The resource, the cod stock, while extremely valuable, will have little or no long-term value to them. Consequently, despite the fact that the vessel owners are using such a valuable resource, they will probably only be able to earn the same income as the owners of aluminium smelters who, on our assumption, were on the margin of the economy. This is a case of harmful effects: the vessel owners are harming one another by their 'congestion' on the fishing grounds (Cf. Turvey, 1964).

Property Rights or Pigovian Taxes?

ON the basis of this analysis, economists working in the tradition of Frank Knight would probably explore the possibility of developing property rights in the fishery. They would observe that the real problem is that nobody owns the fish stock in question. Nobody therefore has a vested interest in so using it that it would be most profitable in the long run. Nobody

has the right to exclude others from its use or to transfer it to others; therefore this scarce resource does not carry a price, as it should. But these economists would run into what Buchanan saw as a problem with Knight's response to Pigou's tale of two roads: the danger of monopoly. Marine resources like fish stocks typically occur on such an immense scale that by granting sole ownership to them, whether the owner would be a government agency or a private company, extensive monopoly power is seemingly created. The sole owner of a fishery, unless his firm has ample competition from fisheries in other parts of the world, would drive up the price of fish by deciding on less fishing effort than would be optimal. So the cure might turn out to be as bad or only a little better than the illness. Instead of many vessel owners harming one another by excessive effort, the sole owner would be harming fish consumers by excessive price.

On a closer analysis, the cure would not be quite as bad as that. First, the rent from the resource would not be dissipated as it would with unrestricted access. This is an advantage from an economic point of view. It is better that somebody enjoys the rent than that it would be wasted. In the second place, it is unlikely that a sole owner of a fishery, even if it is a large one, would control the price of fish in international or even local markets. Experience in the North Atlantic waters shows, for example, that even fishing nations like the Icelanders, Norwegians and Canadians are price-takers. But the fact remains that sole ownership of a whole fishery seems less than desirable. Even if it would solve the problem of harmful effects, other problems would emerge because of the immense scale of the sole firm operating in the fishery. It would never be able to acquire all the knowledge, experience, information and

skills which individual vessel owners have in a typical fishery. Moreover, we would hesitate to hand so much economic power over to any one agent, whether a government agency or a private company. A fish stock seems a prime example of an indivisible good.

There is little doubt, however, about the solution of this problem that economists in the Pigovian tradition would envisage: charging the vessel owners for the use of the resource, where the charge, or corrective tax, would be equal to the difference between the private and social marginal costs. This is indeed what some economists have suggested (Jonsson, 1975; Gislason, 1977; Becker, 1995). Those economists have devoted their time to working out the mathematical formulae describing the conditions under which the resource would be in its most profitable use. The idea of a corrective tax on many competing fishing firms, forcing them to add the social cost of using the fish stock to their calculations, therefore seems very attractive indeed. Such a tax would seemingly do no harm. On the contrary. The fishing firms would continue to compete with one another and to use their special skills and knowledge in harvesting fish, and they would not bear any additional costs because the tax would only amount to the rent previously dissipated. Resource rent taxes are also often regarded as desirable in their own right because they do not have the same distortionary effects on the economy as do other kinds of taxes. An ocean rent tax could replace other and less efficient kinds of taxes as a source of government revenue. This proposal seems a prime example of a Pareto-optimal move: where government intervention has wholly beneficial consequences.

However, the matter is not so simple. A Pigovian corrective tax on fishing firms, forcing them to take the social cost of

harvesting into account, requires for its calculation much more information than can be available to any government agency (Arnason, 1990). First, the tax agency would have to know all the details of the fish stock and its rate of growth at every point in time. Assume that this knowledge can be acquired. But this is knowledge which the fishing firms will definitely try to acquire, so that its acquisition by a government agency will only be a duplication of efforts. In the second place, the value or social cost of a resource is a concept introduced to clarify the analysis, not a given datum. How do we know, in the absence of market transactions, what the value or cost of a resource like a fish stock is? Thirdly, the firms are different in their methods of harvesting, in how they cope with costs and in their strategies for the future. The divergence between the private and social marginal costs which the tax is supposed to correct will therefore be unequal in different firms. This means that the level of taxation will differ from one firm to another. The tax agency would have to calculate a different tax for each firm, after acquiring information about costs and profits and long-term planning in each firm. While each firm obviously has the relevant knowledge about its own methods of operation and long-term strategy, it would have little or no interest in transferring that knowledge to a government agency for the purposes of taxation. Some of it may also not be transferable, for example personal knowledge, special skills and so on which may indeed be more important in the fisheries than many industries. For these reasons, a tax agency would never be able adequately to gather and process the knowledge possessed by each firm. Fourthly, the situation is dynamic, not static. The optimal fishing effort cannot be found once and for all: it is not a point, but a time path. The tax agency would have

to acquire information about changes in all the data which we have described and about the mutual adjustments made in the light of these changes, and then to calculate the correct level of taxation for each firm at each point in time. Clearly, this would not be possible.

The System of Individual Transferable Quotas

A Pigovian corrective tax in the fisheries, while attractive at first sight, is unworkable. It is a beautiful theory killed by an ugly fact. Besides, do its proponents not miss the main point which is that with unrestricted access the individual agents in the fisheries have by their activity harmful effects on one another? The problem is not so much that the net social product will not be as great as it could become in ideal circumstances, but that the owners of capital in the fisheries by trying to further their own interests, in reality work against it. When individuals and firms have by their economic activity harmful effects on one another (where the harm in this case consists in the amount of resource rent being dissipated in excessive effort), it seems somewhat odd that government should step in, not to ensure agreement on, and enforcement of, rules under which they would cease to do so, but rather to capture for itself what the agents had been losing as a result of the absence of proper rules. A wiser strategy would seem to be to try by an appropriate set of rules to enable the individual agents in the fisheries to capture the rent from the resource. If this could be agreed on and attained, the net social product would become as great as it could be, and the harmful effects would disappear in transactions between the agents involved in the fisheries. It should be noted that the

situation in which the individual agents in the fisheries have harmful effects on one another is the outcome of an historical process: initially, fishing firms would not harm one another; it would only be after their number had increased and the total fishing effort had exceeded the optimal one that we could speak of harmful effects.

What is needed in the fisheries is a set of rules restricting access, and thus reducing effort to the optimum (or to put it differently, a set of rules under which decision-makers in the fisheries would have both the necessary information and the incentive to discover the optimal effort). We have seen that a Pigovian tax to accomplish this would not be workable, and that a monopoly consisting in sole ownership is not desirable for various reasons. But the market order has shown before that it is capable of developing rules which enable individuals to coordinate their efforts instead of harming one another, even if the economic resources in question seem indivisible, either because they occur on an immense scale or because their use cannot be confined to paying customers. Take Ronald Coase's description of tie-in contracts to price the services of lighthouses (Coase, 1974). In this paper, I shall argue that if the agents operating in a given fishery were assigned a recognised right to restrict the access of others to that fishery, in other words an exclusive right to harvest the species of fish in question in given territorial waters, and if the right were initially divided up between them in accordance with a generally accepted rule, and if this right were permanent and freely transferable, then the problem not only of the unrestricted access to the resource, but also that of its indivisibility would be solved or overcome. This would be a system of individual transferable share quotas, or ITSQ, as they are commonly called by economists.

In such a system, the collectivity of vessel owners would set the total allowable catch, the TAC, over each fishing season and monitor the individual fishing firms. Each firm would however own a share or quota in this total, a right to harvest a given percentage of the total allowable catch. Its share in the TAC in the first season of the new system would probably be allocated on the basis of historical record since that would be the only rule that all agents involved would be able to agree on. After such an initial allocation, a firm could sell a part of its quota or all of it, and it could likewise buy quotas from other firms; it would also be able to lease its quota or part of it over some period of time. The quotas would be perfectly divisible and fully transferable. In this way, the proper selection mechanism or survival test would be established in the fishery, because quotas would be transferred in transactions from the less to the more efficient fishing firms. Also, fishing effort would be spontaneously reduced because the firms would be able to eliminate excessive fishing capacity by either selling some of their vessels or buying additional quotas. The vessel owners would no longer be removing fish from the sea population regardless of its costs to others, because they would be removing fish at their own cost. Since the quotas would be perfectly divisible, the firms could hold precisely the amount of quotas that they would need, neither more nor less.

Efficiency between individual firms would be brought about by the transferability and divisibility of the quotas. What about efficiency between the fishery and other occupations? This would also be brought about (to the degree possible, in a world of imperfect information) by this system. Since the quotas would be permanent, the firms holding them would take a long-term view of their operations. The firms would have

a vested interest in minimizing their costs in the long run. And since the quotas would be shares in the total allowable catch the firms would want to set the total allowable catch in such a way that the present value of the resource would be maximized. There is an important difference between simple catch quotas and share quotas. If an individual firm held a right to harvest 1,000 metric tonnes of cod it would devote all its energy to doing this in the least costly way. But if the firm held a right to harvest 1% of the total allowable catch (which might happen over a fishing season to be 100,000 metric tonnes of cod, so that its share would be 1,000 metric tonnes), then it would not only try to harvest its share as efficiently as possible, but also support measures aimed at maximizing the present value of that to which it would hold a share, namely the total allowable catch over the fishing season. It would for example have an interest in research into the long-term growth function of the fish stock in question, long-term market conditions and new technology.

The fishery collective would consist of firms whose vested interest would be to set the total allowable catch at the optimal level. It can be shown that the level at which this would be accomplished would be where the prices of the individual transferable share quotas would be maximised (Arnason, 1990). The collective would, as would economic agents in different occupations but faced with similar tasks, try to attain this level by a method of trial and error. The movement of quota prices over a period of time would indicate its relative success in doing that. Needless to say, there would be open access to the collectivity as there is to any industry in a free market order. Anyone who would be willing to pay the price for a quota would be able to buy it. The possession of quotas

would be the only qualification for membership, while voting rights within the collective would probably be on the basis of quota holdings. The possession of quotas would not have to be confined to vessel owners, although they would obviously hold most or all of the quotas at any given point in time. Newcomers would not really have to worry: it would simply be as necessary to buy quotas in order to harvest fish as it is to buy land in order to rear sheep. These are scarce resources to which access has to be restricted, and it is more efficient to restrict it by price than by tradition, location or other such non-economic criteria.

Management or Coordination?

THE introduction of a system of individual transferable share quotas in the fisheries would in effect be a transformation of fish stocks into capital goods. It would also be the establishment of private property rights in fish stocks, because the rights held by quota owners would include the two main components of private property rights, excludability and transferability. The rights of quota owners could be divided into rights held collectively and individually. The collective would have the right to exclude others from the use of the resource; and the individual members of the collectivity would have the right to transfer their quotas at will. The good in question, the fish stock, would be recognised as indivisible in one sense, hence the existence of the collective, and divisible in another sense, hence the existence of individual firms competing with one another for quotas. This system can also be regarded as a means to achieve the proper division of knowledge and decision-making in the fisheries (Hayek, 1945). The knowledge about the most efficient methods of harvesting rests with individual fishing firms or emerges in their competition; they have

to make the decisions about such matters. But the decision about the total allowable catch over the fishing season has to be made by the collective, because it has a vested interest in acquiring the knowledge necessary for that decision, and not less importantly, to act on that knowledge.

It should be clear from these considerations that the problem of the fisheries is not one of proper management: the term 'fisheries management' often used in the discussion of the problem of the fisheries is therefore misleading. Individual fishing firms certainly have to be managed properly, but not the whole fishery because it would not and should not consist of a sole company. The problem of the fisheries is instead one of coordination. Without the rules that we have described, the individual fishing firms will start to harm one another when the optimal fishing effort has been reached. After that, an additional unit of fishing effort, say an extra fishing boat, will be harmful to those who have been devoting themselves to commercial fishing. The point is that there exists a set of rules under which the vessel owners will be able to coordinate their activities in such a way that they will not harm one another, but can reap the whole benefit of the rich resource that they use. The usual approach of economists to the problem, i.e. setting out the conditions for maximization in the fisheries in mathematical equations and then relying on government to bring the maximization about, is not always very helpful. It masks the fact that there are individual agents operating in the fisheries as in other segments of market order, and they have to be induced to acquire and act on the available knowledge.

The limitations of the managerial approach to the fisheries are best seen when the simple question is asked: who would invest time and effort in improving the arrangements which

lead to the dissipation of rent with unrestricted access? A possible answer would be government because the rent could in theory be captured and turned into tax revenue. Certainly the fisheries could be made more profitable, for example by a system similar to that which we have described, which would reduce effort to a nearly optimal one. Then a special tax could be imposed to take away some or most of the rent captured by the individual fishing firms, even if the level of taxation would be somewhat arbitrary because no government agency would be able to acquire the information necessary to calculate the economically most efficient tax, as we have seen. But it is highly unlikely that the present vessel owners in our story would support a reform leading to any special fisheries tax like that. They would instead invest time and effort in opposing it because some of them would be put out of business by it without compensation (because the reform would reduce fishing effort), and while others would survive they would have to share the benefits from a better system with government. Since in a liberal democracy as we know it the support of at least a large group of vessel owners would be needed for a radical change like this, it would not be a likely outcome. The vessel owners would think that they had more to lose than the politicians would think that they had to gain from such a change. Moreover, while it might not matter much to the government officials and politicians debating the issue, this would also be an economically inefficient change, for a different reason, i.e. the hope or fact that a new tax revenue would increase political rent-seeking, not least if the change were obvious and substantial instead of being implemented gradually. All kinds of interest groups would make bids for

the new revenue. Rent dissipation onshore would replace rent dissipation offshore.

Those who are harmed by the unrestricted access to the fishing grounds, namely owners of fishing vessels, are likely to be those most interested in measures that would eliminate the harm. They stand to gain by the establishment of rights of exclusion while hardly anyone else stands to lose (except perhaps, in the short run, shipyards, producers of fishing gear and the crew employed on fishing vessels that would be put out of operation after the change, but information costs would normally be too high for these groups correctly to anticipate the short-term effects of the change on them; besides, we do not usually regard sellers of services or goods as being entitled to the business of their customers, if the customers can by new rules, technologies or managerial methods do without their services or goods). Newcomers would not lose by the restricted access, either, if the restriction would be by price rather than tradition or locality, because the fisheries would remain open, but at the right price, and net average income to be derived from the fisheries with unrestricted access would not anyway be higher than that which would be available in other occupations (this fact should also facilitate the search by the crew losing their jobs after the change in systems for new and comparable employment). It should be pointed out that the main economic argument for the 'first come, first served' rule which is most frequently used in the initial assignment of new rights that emerge as responses to new harmful effects, may indeed be that it is usually less costly for those who have not begun working in a particular field, to seek and find alternative occupations than it would be for those who have made it their life's work (Demsetz, 1988).

Once the dissipation of rent in the fisheries becomes obvious, and provided that the technology exists for the exclusion of the resource (which it does, cf. De Alessi 1998), the vessel owners are likely to support the necessary change, perhaps even the introduction of a system of individual transferable share quotas. It would only mean that the present users of the resource who were harmed by the lack of a right to exclude others from its use, would gain such a right. Government would not need to manage one thing or another in the fisheries; it would only have to make the rights of the fishing collective and of individual quota-holders legally enforceable. Government would, in other words, only have to perform the function which most people see as its legitimate function, to develop and define and defend the general rules under which people can solve their differences. THE managerial approach to the fisheries masks the fact that a given fishery cannot be treated solely as a homogeneous whole, delivering a net total revenue to be maximised. It consists of many individual firms, some of which will have to cease operations as a result of the change from a system of unrestricted access to some system of exclusivity. The great advantage of the system of individual transferable quotas is that the adjustment process (the reduction of fishing effort) is relatively peaceful because those vessel owners who leave the fishery do so because they have sold their initial share of quotas to others. The right to exclude non-members of the collectivity and to transfer shares is also a right to pay the less efficient members to leave the fishery. Although strictly speaking by excessive effort with unrestricted access all the vessel owners are harming one another, we can look upon the purchases of quotas from the less efficient as payments to those who do harm in the fishery to induce them to cease to do so. The problem

of harmful effects is solved by enabling those affected by it (those who should remain in the fishery because they are more efficient) to compensate or pay those who caused it (those who should not remain in the fishery) for stopping the operations leading to the harm. The great advantage of the system is that both groups who would initially be operating would benefit: the owners of the more efficient firms would remain and slowly begin to capture the rent to be derived from the resource, while the owners of the less efficient firms would be paid to leave. Similarly, the great disadvantage of the idea that government should reduce fishing effort by increasing the costs of all fishing firms, is that no compensation would be offered to those who would have to leave the fishery which means that they would vigorously oppose the change to a better system. It is like a destination without any means of getting there.

The Unanimity Test

SOME general comments that James M. Buchanan has made on who would care whether the commons were privatized or not, seem appropriate here:

IN one sense, no one in the community bears or suffers the incidence of the inefficiency that the absence of private ownership [in the commons] creates. The loss is to be reckoned here only in terms of foregone opportunities rather than consciously sensed damages or harms. On the other hand, the restriction of the usage of a facility, through pricing or otherwise, that was previously available on some unrestricted basis, may be opposed, in part, irrationally, and especially if users consider that the rights have been arbitrarily assigned. In this setting, in particular,

envy may emerge to tilt the balance toward maintenance of the status quo tragedy of the commons. Such a prospect, which may well loom large in real situations, suggests that some Wicksellian test should be incorporated into early considerations of institutional change, and that users of the relevant resource to be privatized be assigned at least some share in the value created by privatization (Buchanan, 1997).

IN this paper, the argument is that if the traditional users of the fish stocks in a given fishery are assigned the whole value created by 'privatization'—the introduction of individual transferable share quotas as previously described—they are likely to support the necessary change, but that otherwise it would be doubtful whether the change would be brought about.

In his comments on the political feasibility of privatizing the commons, Buchanan goes on to remark that the orthodox treatment of harmful effects because of unrestricted access (the tragedy of the commons) may be flawed by an unquestioned adherence to the postulates of neoclassical economic theory. The analysis of the fisheries seems a good example of what Buchanan means. The orthodox economist employs a blackboard where he writes down the harvesting and cost functions of the fishing firms and the growth function of the fish stock. Then he shows that the fishing firms will not maximize their net revenue with unrestricted access because they do not take fully into account the value of the resource they use, that is its 'shadow cost'. The economist goes on to demonstrate on the blackboard that a tax, imposed by government and equal to the difference between private cost and shadow cost, will force the firms to economize fully on the resource, so that its value will be maximized, and that the tax will have the added advantage of replacing other

inferior kinds of taxes. Or he will demonstrate, on the same blackboard, that a sole firm operating in the fishery would attain the same objective of maximizing value. Finally, the imposition of the corrective tax, or the establishment of a sole firm in the fishery, is taken to be an instance of achieving a Pareto-optimal situation where there is a gain without a loss.

What is left out in this orthodox treatment of the problem, perhaps because it cannot easily be written down on the blackboard, is that government is not like a maximizing economist, but rather like a process in which individual agents and groups try to further their interests and agendas under some sets of rules; and that the data necessary to solve the mathematical formulae on the blackboard are usually not available to any one mind, let alone any one government agency; and that often there are losers (or at least people who perceive themselves as being losers) as well as beneficiaries from a change of systems like that of restricting by price access to a given fishery. These losers are those in the fishery who are unable to pay the required price. The two flaws in the orthodox analysis of the fisheries are the presumption of omniscience on the one hand and the neglect of what can be called the constitutional aspect of the problem on the other hand. The problem of the fisheries is a constitutional problem because the individual agents operating in the fishery have to see that the rules to which they are asked to agree will benefit all of them. They have to realize that they are being bound by rules so that they can be free, that the proposed restriction of access to the fishery is a restriction of the opportunity to engage in economic activity with harmful effects, but not really an infringement of the full freedom of each compatible with the equal freedom of all. The test of whether a proposed change

will lead to a Pareto-optimal situation is not what the economist demonstrates on his blackboard, but what the individual agents operating in the fishery will agree on (Buchanan, 1959). The system of individual transferable share quotas survives this test, but neither the corrective Pigovian tax nor the establishment of a sole firm does so.

As a final paradox, it should be noted that when a system like that of individual transferable share quotas has been in operation in a given fishery over an extended period of time, the problem of rent derivation may replace that of rent dissipation. Once the fishing effort has become nearly optimal, and the fishing firms start to derive considerable net revenues from their sole access to the fertile fishing grounds, people in other occupations may start to complain about the ocean rent. Their cause of complaint cannot be that they have been harmed by the change of systems. But they may argue that the introduction of private property rights in the fishery removes a valuable resource from the public domain. How we would view their claim to a share in the ocean rent would probably depend on how we regarded the initial legal status of the resource: was the fish stock in question not subject to any kind of ownership before the change, or was it owned by the 'public', which must in this context mean by government? While it may be more plausible to regard the initial legal status as being one of non-ownership, this will not placate those complaining about the rent. It is difficult however to predict the outcome of a political conflict about the ocean rent. On the surface, though, the quota-holders would be more likely to win because they would be a much smaller group with a clear identity and a strong vested interest in retaining the rent. But it may certainly appear offensive to many people to observe vessel owners deriving huge revenues from the control

of a resource which used to be in the public domain—revenues plainly undeserved.

It is an interesting question about harmful effects whether those who are outsiders in the sense that they were neither causing nor suffering the harm, should be included in the search for and bargaining about a set of rules that would enable those affected to coordinate their activities in such a way that the harm would be kept to a tolerable minimum. Should we extend the unanimity test to those not affected in any way by the change (except that they will indirectly benefit from the increased net revenue in the fisheries)? Should we require their acceptance of the new set of rules or 'constitution' in the fisheries? It is true that those not employed in the fisheries are usually also taxpayers and voters, so that they can be regarded as standing behind government when it provides the immensely valuable service of developing, defining and defending the set of rules under which people can coordinate their activities. However, that argument works both ways: There is nothing about the set of rules coming into being in the fisheries that would make it fundamentally different from sets of rules, say, about exclusive rights to use land, coal mines or forests. All those rules are beneficial, and all have to be made enforceable by government. Good fences make good neighbours, but the fences have to be erected and kept up. Be that as it may, it is fairly foreseeable if the right of outsiders to enter the bargaining process about a set of rules for the fisheries is recognised, then it is likely that they would not accept the new set of rules described here unless they got a share in the rent. The result would be some kind of Georgism in marine resources: the recognition of the right of the public to all or a part of the rent derived from the sole access to marine resources like a given fish stock (Cf. George,

1880/1951). Whether Georgism is plausible as an economic and ethical theory is a different story (Alchian, 1987).

The Icelandic Experience

THE theory expounded in this paper is more than a theory. The Icelanders, probably the only developed nation that depends on fishing as the main source of income, have been developing a system of individual transferable share quotas from 1975 (Cf. Arnason and Runolfsson, 1997). Here I can only briefly note the nature and evolution of this system. The Icelandic quota system has most of the important features of an efficient ITSQ-system although it has other features that make it less than efficient: the quotas can only be held by owners of fishing vessels; while the quotas are divisible and can be sold without restrictions, they can only be leased over the fishing season with the permission of local authorities; there are some minor exceptions to the system (some small boats do not operate under it, for example); the government sets the total allowable catch, although in close cooperation with the association of owners of fishing vessels (and on the advice of marine biologists); and there is some uncertainty as to the legal status of the quotas, because they are allocated indefinitely rather than permanently. Nevertheless, it is a much more efficient system than is to be found in other European countries. From the beginning of 1991, as a result of a law passed in the spring of 1990, access to all the valuable fish stocks in the Icelandic territorial waters has been restricted by individual transferable share quotas. The fishing fleet has been reduced while the fish stocks are regaining their former strength, and the fishing firms are quite profitable, indeed so profitable that some have come to view that as a problem, as we shall see.

The process by which the Icelandic system of ITSQs came into being from 1975 to 1990 was a slow and painful learning process; the system developed by trial and error, as it became obvious that ITSQs were superior to other kinds of restrictions. This was also a bargaining process. The fishing community and government had not only to understand the problems and their solutions, but also to reach an agreement. Some interesting features of this bargaining process should be noted. First, agreement on ITSQs came much earlier in the pelagic fisheries (harvesting herring and capelin) than in the demersal ones (harvesting cod, haddock, redfish and other bottom-dwelling species). Quotas were first allocated in the pelagic fisheries in 1975, but as late as 1984 in the demersal fisheries, and still some small boats are outside the system. The explanation for this lies in a well-known phenomenon in the theory of bargaining: Homogeneity lessens bargaining costs. The pelagic fisheries are relatively homogeneous, consisting of boats of a roughly similar size and with similar harvesting capacity. Moreover, as the herring and capelin stocks have to be chased over large areas of the sea, no one group of boat-owners enjoys a significant advantage in terms of locations. Because the pelagic fisheries were relatively homogeneous, the initial allocation of quotas was a simple task: each boat received an equal share. The demersal fisheries, on the other hand, are quite heterogeneous, including large freezer trawlers, mid-size and multi-purpose vessels, and small boats. The boat-owners were reluctant to accept any restrictions at all on their harvesting, and many of them preferred restrictions on harvesting capacity to those in terms of catch. Also, the most fertile demersal fishing grounds are to be found to the Northwest of the country, and vessel owners located close to those grounds perceived their

interests to differ from those of vessel owners elsewhere. Vessel owners in the Northwest did not want restrictions in terms of catch, but rather in terms of effort, because their harvesting required less effort.

What was it, then, that brought about the agreement by the majority of vessel owners in the demersal fisheries to introduce individual share quotas? One important factor was desperation, which certainly tends to lessen bargaining costs (Cf. Libecap, 1989). The changes and adjustments in the rules under which the vessel owners operated were usually only made when impending crises forced those vessel owners to search for ways of restricting access to the fisheries. Government played a largely passive role, doing mainly what the powerful Association of Icelandic Fishing Vessel Owners asked it to do. Interestingly, Icelandic economists, with a few exceptions (like Ragnar Arnason, the Professor of the Economics of the Fisheries at the University of Iceland), did not have much impact on the development of the system of ITQs; most of them approached the task in the manner of those blackboard economists who have been criticized in this paper, regarding it as a question of deriving a set of mathematical formulae describing the proper objectives of the managers of the fisheries, not as a search for an appropriate set of rules to take harmful effects into account. Not unsurprisingly these economists mostly advocated a Pigovian corrective tax in the fisheries (Cf. Gylfason, 1990). But because government cooperated so closely with the vessel owners (Jonsson, 1990), the change towards the ITSQ-system was relatively peaceful; the quotas were initially allocated on the basis of the catch of the recipients for the previous three years (with some corrections, for example if a vessel had been undergoing repairs, or if it only started operations two years

before the change). Slowly, but surely, the fishing effort has been reduced as the more efficient fishing firms have been buying up quotas from the less efficient ones. This method of initial allocation was undoubtedly the other important factor in bringing about the agreement necessary for the introduction of the ITSQ-system. No vessel owner had to suffer a worsened position; each could choose whether he would remain in the fisheries using his quotas or leave them after having found an acceptable price for his quotas.

However, while quota transactions certainly have reduced the fishing fleet without harming the vessel owners (and slowly enough that their crew have been able to adjust and find new occupations), and while such transactions are necessary for the efficient future operation of the fishing vessels, they have caused some resentment in Iceland. Many people do not like the sight of some vessel owners selling their quotas for vast sums of money, and other vessel owners reaping huge profits from their exclusive access to a very valuable natural resource. The most vocal critics of the presumed accumulation of wealth in the fisheries have been those economists who previously advocated a Pigovian corrective tax (Gylfason 1990; Moller, 1996). Now they advocate a tax to expropriate all or some of the rent being captured from the fisheries, arguing that the vessel owners have not only to reach an agreement among themselves and with the government, but also with the rest of the population. The system of rules in the fisheries has to be acceptable to the nation at large, they contend. While this may be true, it is doubtful that a special resource tax on the fisheries would tend to lessen resentment and discontent in Icelandic society. One reason is that such a tax would hit those who chose to remain in the fisheries after the introduction of the ITSQ-

system, and not those who chose to leave it. The more efficient vessel owners would be punished, which would certainly not be acceptable to them, at least, while the less efficient ones would be seen to be rewarded, which again would cause resentment. Another reason has already been noted. It is that such a new source of revenue would intensify the already bitter fight among political interest groups for shares in government revenues. Energy and initiative would be diverted from the creation of wealth to its political distribution. It should be pointed out, finally, that resentment directed at high profits in the fisheries would most likely be a temporary phenomenon, because after a period of adjustment, the rent would not appear as additional income at the disposal of vessel owners, but rather as additional capital in their books. Then any remaining resentment and discontent would be seen to be not really because of the rules adopted in the fisheries, but because those rules, like rules in most industries in a free market order, provide for the private ownership of capital goods.

Non-Exclusive Resources and Rights of Exclusion

PRIVATE property rights to goods such as natural resources are rights that an owner has to exclude others from the utilisation of such goods. They are rights against other people. How can individuals come to have such rights? And why should they have them? Locke (1690) dealt with the first question. For him, property was natural in the sense that its emergence preceded that of government, which was indeed established to protect property. While Locke started from the premise that God had given the goods of the earth to mankind in common, he argued that individuals could come to appropriate individual goods, provided that there was “enough and as good left in common for others”: this is the Lockean proviso, as Nozick (1974) called it. Nozick submitted that the proviso had to be changed to be feasible: it should be that others would not be made worse off by the appropriation of goods by an individual. In Nozick’s theory, people did not necessarily deserve what they had, whether individual abilities or worldly goods: but they were entitled to their goods, either because they had not made others worse off by appropriating goods, or because they had been transferred to them without violating the rights of others, e.g. sold or given to them, or genetically passed on to them. Hume (1739) discussed the second question, why people should have private property rights. Nature was niggardly, and people were selfish, he argued. Therefore, to ensure peace and prosperity, they had

to adopt certain rules of conduct, the most important being those of permanence of possessions and transfers by consent. In other words, good fences made good neighbours. Demsetz, in the spirit of Hume, explains the emergence of private property rights by scarcity: when goods became scarce, possibly because of new technology or changes in consumer taste, individuals can reduce harmful effects of economic activity to a tolerable minimum by establishing property rights to those goods. The theory of private property rights expounded by Locke, Nozick, Hume and Demsetz is cogent and powerful when applied to divisible goods like land and cattle. Land can be fenced off; cattle can be branded. The owners will look after their goods; everybody, or at least most people, will be better off, as a result. But what about seemingly indivisible goods like radio frequencies, mountain pastures, salmon rivers, and offshore fishing grounds? How can people come to have rights to them? And why should they? In this paper, a few such examples will be discussed.

Warming on Offshore Fisheries

THE first economist to subject the fishery to a systematic analysis, Warming (1911) argued that, under the conditions of his day and time, it would not be efficient. Consider two offshore fishing grounds, A and B, of different fertility. It could easily be demonstrated that, other things being even, too many boats would utilise the more fertile fishing ground A in comparison with the less fertile fishing ground B. (To use the language of economists: boats would move from the less to the more fertile fishing ground, until average net revenue would be equal on both grounds, whereas they ought to be allocated in such a way that marginal net revenue was equal on both

grounds.) The reason was open access: the two fishing grounds were non-exclusive resources. There was no price reflecting their different scarcities and directing individuals to their most efficient utilisation in comparison with economic possibilities on land. The fishermen regarded both fishing grounds as free goods. Warming pointed out that rent ought to be derived from a fishing ground, similar to the rent derivable from a plot of land. But unlike land rent, this kind of rent was dissipated in excessive harvesting cost. Fishing effort would expand, new boats would be added to the fleet, until there was no more profit to be had from the fishery. To solve the problem, Warming suggested access fees which would reflect the different scarcities of the two fishing grounds: Government would charge a boat harvesting in the more fertile fishing ground more than it would a boat harvesting in the less fertile one. In essence, his proposal was to define property rights to the two fishing grounds, where the owner would be government rather than individual fishing firms which would however utilise the grounds, for a fee. The idea was to restrict access and thus to turn the fishing grounds into exclusive resources.

While Warming was right that the explanation for the fishery's inefficiency was open access to fishing grounds, his analysis was flawed. First, his suggestion of different access fees to different fishing grounds presupposed more knowledge about these grounds than government could be expected to possess and also easier monitoring of harvesting in these grounds than was likely to be the case. In the second place, while he explained the need, or "demand" for property rights in the fishery, he did not analyse the "supply" side, namely the political process which might or might not provide a solution. This point will be discussed more fully below. Thirdly, the rent dissipation which

occurred should really be seen as the problem of harmful effects which the economic activities of individual fishermen had on them as a group. Fish stocks were scarce resources. There was therefore an incentive to rush to the fishing grounds and harvest fish before anyone else came along; there was an incentive to over-invest in the fishery. Thus, the fishermen imposed costs on one another. An externality was created. The proper remedy was to try to find rules under which the fishermen could cease to impose these costs on one another, or at least reduce these costs to a tolerable minimum. The proper remedy was to try to allow the fishermen to internalise the externality. This is what individual property rights are for. Instead of government declaring, in effect, the various fishing grounds public property, and charging for their utilisation, it seems that it should have allowed the fishermen to appropriate the fishing grounds and exclude others from their utilisation. Then they would have been able to capture the rent which they had previously lost by over-investment. Indeed, on Warming's premises, namely that there were clearly identifiable fishing grounds, the definition of private property rights to the fishing grounds should have been relatively easy. However, there are at least two related problems with creating such territorial rights in fisheries. One of them is that individual fishing grounds may extend over immense areas at sea, far too big to be appropriated by any one firm. The other is that some fish stocks (such as herring in the North Atlantic Ocean and tuna in the Pacific Ocean) are not confined to any one identifiable fishing ground; they are fugitive in nature, moving from the territorial waters of one country to those of another.

Warming on Coastal Fisheries

WARMING's 1911 paper did not have any impact. The economics of fisheries was developed by Canadian and U.S. economists in the 1950s (Gordon, 1954; Scott, 1955), without any reference to his work. But Warming returned to the subject, from a different angle, in a paper twenty years later (1931). In Denmark, eels are caught in traps laid out at sea, close to the coast. Traditionally, owners of farms by the coast possessed the rights to lay such eel traps. They did not utilise the resource themselves, but leased the rights out to a community of professional eel fishermen. In the 1920s and early 1930s, this community put pressure on the Danish government to abolish the traditional rights of farm owners by the coast to lay eel traps. Warming's second paper was a warning against such a change in the law. He pointed out that this would be a change for the worse, from restricted to open access. The rent dissipation by over-investment brought about by open access would inevitably occur. It would be an illusion that the eel fishermen would be better off by gaining open access. Instead of having to use a part of their income to pay farmers by the coast for eel trap leases, they would probably use an equal amount for equipment and other kinds of increased effort. Moreover, since the rights to lay eel traps were traditional rights possessed by the farmers, government would have to compensate them, if it abolished these rights. Alas, government did not take Warming's advice; it abolished the rights—an example where the “supply” side of private property rights failed.

In his paper, Warming pointed out that it was better that the farm owners by the coast received rent from the eel fishery than that nobody would receive it, as would have been the case if the farmers' rights to lay eel traps had been abolished. He

did not point out, however, that a plausible response to the concern of the eel fishermen would have been to facilitate their buying the rights from the farm owners permanently instead of just leasing them over a fishing season. It would have been a mutually beneficial trade, since presumably the rights would have been worth more to the fishermen than to the farm owners for whom it only provided additional income. Another important point is shown by Warming's analysis. It is that some fisheries are territorial in nature so that private property rights in them are feasible. Apart from the Danish eel fishery, the shrimp and lobster and scallops industries in Iceland are other such examples. The products are harvested close to the coast, in local, easily identifiable harvesting grounds, mostly rather small. There is no reason why such harvesting grounds could not be privately owned. Fencing (or rather monitoring) costs are not high, and the good is perfectly divisible. Indeed, traditionally farmers by the coast in Iceland possess exclusive rights to harvest goods both on the shore (such as eggs and eiderdown, driftwood and whales) and out at sea, reaching out to 110 m off the coast at high tide. Farmers by lakes in Iceland hold similar rights: each individual farmer by a lake possesses an exclusive right to harvest goods in the lake (mainly freshwater trout), again extending out to 110 m offshore; if the lake is sufficiently big that an area is left over, then this area belongs to all the farmers by the lake in common (it is then not a commons, but rather communal property). Before the late 19th century, when Iceland was a poor country, with the population surviving on subsistence agriculture, the goods found along the shore, such as eggs, driftwood and the occasional beached whale, were quite important. Eiderdown remains a valuable good.

U.S. Broadcasting

ACCORDING to Demsetz, private property rights typically emerge in response to new and harmful effects of economic activities brought about by new scarcities. Commercial broadcasting in the U.S. since the early 1920s would seem to be a good example. There were limits to the number of radio stations which could operate in a certain area. A station had to be confined to a certain area, and transmit over a certain radio frequency, if it was not to interfere with similar activities of other stations in its vicinity. But at present, broadcasting is regulated by government; a station receives a non-transferable license to broadcast, in a certain area and over a certain radio frequency. In many other countries, at least until recently, government even retains a monopoly on broadcasting. Why did private property rights not emerge in this situation? Hazlett shows (1990) that they did emerge in the U.S. In 1920–23, the secretary of commerce issued licenses to radio stations, on demand. When excess demand developed, the secretary withheld additional licenses. In 1923, a court decided that the secretary had no authority to do so, since he had no legal standard on which to choose between competing applicants. He was allowed, however, to select location, time and frequency of individual stations so as to minimise interference. In 1923–26, the secretary continued, in practice, to ration scarce broadcasting licenses. Since radio stations retained their licenses when sold, there was a price on licenses, or radio frequencies, indirectly reflected in the price of stations. However, in 1926 a court decided that the federal government had no authority to define individual rights to the radio spectrum such as the licenses issued by the secretary of commerce. This seemed to create open access to a scarce resource, with chaos as the result. In a court decision

in the autumn of 1926, a possible solution emerged. The radio station WGN had been broadcasting at a certain frequency in the Chicago area where it had established some following among listeners. Another station began broadcasting on an adjacent frequency in September 1926, causing WGN to file a complaint alleging that it was necessary to maintain at least a certain separation of frequencies on stations located within 100 miles of each other and that the newcomer was injuring a lawfully acquired business property, namely the good will associated with WGN's established radio frequency. The court decided, on the basis of common law, that since radio stations had in recent years been bought and sold on the understanding that they would retain their licenses, and since they usually had established some following, or good will, in the locations in which they operated, they were entitled to the exclusive use of the frequencies at which they had been broadcasting. Hence, the court upheld WGN's complaint.

The court decided, in effect, that private property rights could be established in the radio spectrum, by homesteading or the first occupancy principle. After the decision, several stations moved to file similar claims as WGN. It seemed that broadcasting rights would be established as private property rights. At this moment, however, Congress intervened, with the endorsement of the secretary of commerce, Hoover, later to become President of the U.S. It passed a bill making the radio spectrum public property and giving a federal commission the authority to issue non-transferable broadcasting licenses. The bill's author, Senator Dill, spoke with great clarity on the matter. "Uncle Sam should not only police this "new beat"; he should see to it that no one uses it who does not promise to be good and well-behaved." The major broadcasters supported the bill,

because licenses were initially more or less issued in accordance with established practice. They had lobbied for the denial of licenses for newcomers, and for not extending the broadcast band, as was technically possible. Hazlett contends that the 1927 broadcasting law was the product of an informal alliance between the larger broadcasters who wanted further limits on entry than those that would have been brought about by well-functioning market forces, and the politicians who wanted to have at least some control over the new media. The interesting story told by Hazlett holds two lessons. First, there was a feasible solution to the problem of interference in the radio spectrum; it was a solution in terms of private property rights that could be exclusive, divisible, transferable, and permanent. Some economists in the 1950s and 1960s, noting the inefficiency of broadcasting regulation in the U.S., advocated creating a free market in broadcasting licenses by auctioning them off. But this would have been unnecessary if the law had been allowed to develop in the direction that it was taking in the autumn of 1926. The second lesson is that it is not sufficient to analyse the behaviour of participants in the market process, under existing technical constraints: the part played by politicians should not be neglected. There is not only the “demand” side of property rights; there is also the “supply” side.

Mountain Pastures in Iceland

ICELAND was discovered by Nordic vikings in the 9th century and settled, mainly from Norway, in 874–930. While the country is large, only parts of it are inhabitable, typically narrow valleys stretching down to the coast, with rivers running through them, surrounded by highlands, heaths and mountains, often capped by glaciers. The settlers soon discovered that the raising

of livestock was more feasible than the cultivation of fields. Herds of sheep could graze unattended in mountain pastures in summer, as no wild animals (except foxes) threatened them. Each settler claimed in a valley a plot of land for himself and his family and household. But most mountain pastures became the collective property of the valley farming community, the so-called “hreppur”, which oversaw not only grazing in mountain pastures, but also collected taxes and provided for mutual insurance against loss of livestock or houses, and for the maintenance of the poor. Why were the mountain pastures not claimed as private property, like the valley farmlands? The main reason was that exclusion costs for individual plots would have been quite high whereas they would be much lower for vast areas (Eggertsson, 1992). Individual plots would have had to be large, as vegetation was scattered, and sensitive to climatic changes so that grazing conditions varied from one year to another. Monitoring costs would have been high. While fencing costs would have been prohibitive in the rugged terrain, nature itself often formed natural enclosures with rivers, lakes, steep mountains, wasteland and glaciers, but these enclosures extended over large areas. There were also important economies of scale in driving sheep up to the mountains in early summer and in searching the pastures and driving the flocks down again in the autumn.

Even if mountain pastures were not strictly speaking a collective good, their joint utilisation was therefore economical. But in that case, three problems of internal governance had to be solved. What was the most economical unit of utilisation? How did farmers utilising a certain mountain pasture enforce their individual property rights in sheep? And how did the farmers avoid over-grazing? The answer to the first question is

this. The hreppur became the unit of utilisation because it was already in place, and in most cases it had natural boundaries, the area of a hreppur typically coinciding with a valley, surrounded by mountains. Moreover, transaction costs in the hreppur community were low, as people knew one another, the community was stable, and reputation was highly valued. The answer to the second question is that it was easy to enforce individual property rights in sheep. They were simply marked on the ear, each farmer having his own particular mark. The answer to the third question is that the farmers avoided overgrazing by a system of individual grazing rights. There was an incentive for each farmer to drive more sheep up to the mountain than was optimal, because he would think that he would reap the whole benefit of more of his sheep grazing there, but that he would share the cost with all the other farmers. To avoid such free riders, the leaders of each farming community were instructed by law to find the maximum number of sheep that could graze in the pastures without affecting the average weight of the flock. In the words of the old Icelandic lawbook, in force until 1280, "Let them find that number, which in their judgement does not give fatter sheep if reduced but also fills the pasture." Once the total quota, or the total allowable number of animals, had been set, each farmer was given a quota on the basis of the value of his farm. A farmer who exceeded his quota paid for each additional sheep a penalty to his fellow members of the community that was twice the rent to an outsider for using the pasture. There is some evidence that this system of joint utilisation of mountain pastures and individual grazing rights worked quite well and fulfilled its function of restricting access to the optimal level (Eggertsson, 1992).

Salmon Rivers in Iceland

THE Icelandic settlers quickly discovered that about 80 rivers running down from the mountains through the valleys out to sea had ample supplies of salmon. It is a fish which usually spends the first 3–4 years in those rivers; then it migrates to sea to feed there for 1–3 years, returning to spawn in the rivers. While salmon rivers are typical collective or indivisible goods, they did not really become a scarce natural resource until the 19th century. The Icelandic salmon fishery is mainly regulated by tradition and by laws dating from the 19th century. No harvesting of salmon at sea is allowed. In the freshwater fishery, traditionally, riparian farmers have owned the fishing rights. For each river, the riparian farmers are required to form a fishing association operating the river. The fishing season is from late May to the end of September. The daily fishing period is 12 hours, between dawn and sunset, and fishing is always prohibited between 3 am to 7 am. Only fishing by rod and line is allowed. There is a maximum, or total allowable, number of rods for each river, set by the Directorate of Freshwater Fisheries. As a rule of thumb 1 fish a day for a rod is used to determine the total allowable number of rods; in some rivers there are further restrictions on allowable bait. Usually, the fishing rights are leased out by the fishing associations to angling associations. By this, the average value of each fish is at least ten times higher than the price on a fish market. The angling associations, in turn, lease out rods per days to individuals and companies. At present, the freshwater salmon fishery in Iceland is quite valuable: each fishing season about 35,000 salmons on average are caught, and the total worth of fishing leases for a season is estimated to be US\$ 30 millions

(Gudbergsson, 2003). The salmon rivers do not seem in any danger of being overfished. Moreover, many fishing associations have tried, with some success, to enhance the salmon stocks in their rivers by hatcheries.

The fishing rights in Icelandic salmon rivers may be regarded as private property rights held by riparian farmers. But they are peculiar in some ways. While they are exclusive and permanent, they are not divisible or wholly transferable. A farmer is not allowed permanently to sell the fishing rights associated with his farm although the fishing association of which he is a member usually leases them out over the season. So, they are only transferable over the fishing season, not in perpetuity. This undoubtedly reflects the political will to maintain traditional farming in the valleys of Iceland. But the fishing rights are further circumscribed, it seems, by regulations on allowable fishing gear and the total allowable number of rods in each river. If the objective is to catch salmon with the minimum cost, then presumably it should be caught in nets at the river mouth, not by individual anglers with rods. Why is the fishing gear restricted to rod and line? It is because salmon fishing is essentially recreational. The market for fishing licenses, the rods per days, is not a market for salmon, but for the experience of enjoying nature while fishing. The quotas in the salmon rivers are essentially effort quotas, expressed in terms of allowable fishing gear, fishing time and fishing season, sometimes even allowable bait. It is well-known that effort quotas in fisheries are less efficient than catch quotas, because their holders do not have a sufficient incentive to minimise cost; they rather tend to try to maximise output. But the output in this case is precisely what is sought: it is to spend a whole day trying to catch as many salmons as one can, with a rod.

Offshore Fisheries in Iceland

THERE are three types of offshore fisheries in Iceland. The most important ones are the demersal fisheries, for cod, haddock, redfish and other species, usually operating in well-defined deep-sea fishing grounds (demersal fish is often called groundfish). Then there are the pelagic fisheries, for herring and capelin which roam over vast areas of the North Atlantic Ocean, in and out of Icelandic territorial waters. Finally there are the shrimp, lobster and scallop fisheries, operating in local grounds fairly close to the coast. It had quite an impact on the Icelandic fishing community when herring virtually disappeared, as a result of overfishing, in the mid-1960s. Therefore, the fishing community was responsive when reports by marine biologists in the mid-1970s indicated that the cod stock was also in danger of collapsing. When Iceland had extended her territorial waters to 200 miles in 1975, government could start managing the resource, with the support of the fishing community. In 1975, after a moratorium on herring, harvesting was resumed with a total allowable catch, TAC, set by the Minister of Fisheries, and with each herring vessel (which were all of roughly the same size and with a similar fishing capacity) receiving an equal individual quota in this TAC. The individual quotas were made transferable in 1979. In the demersal fisheries, in 1977–83 there was a system of effort quotas, in terms of a fixed number of allowable fishing days at sea. This did not work. In order to reach the total allowable catch, the number of fishing days had to be reduced, for example for the large trawlers from 323 days in 1977 to 215 in 1981. At the end of 1983, government, in co-operation with the fishing community, decided to adopt catch quotas. This was a controversial decision. The Western fjords of Iceland are closest to the most fertile fishing grounds,

and because the fishermen there thought that they benefitted from effort quotas, they fiercely resisted catch quotas. As a compromise, the system was mixed for a number of years. But since 1991, it has been a comprehensive system of individual transferable quotas, ITQs, in all commercial fisheries. The Minister of fisheries, on the advice of marine biologists, sets a TAC for each species. Originally, individual quotas were allocated to fishing vessels in the demersal fisheries on the basis of their catch history in the three years prior to 1984, but since the quotas soon became transferable, more than 80% of them have changed hands.

The ITQs are essentially non-territorial extraction rights to fish stocks. The reason they are non-territorial is that at least the pelagic species of fish are fugitive in nature, roaming over vast areas. Moreover, even if there are well-defined fishing grounds for the demersal species, they vary in quality so the fishing vessels want the flexibility of moving from one to another. It is really only in the shrimp, lobster and scallop fisheries where territorial fishing rights could have been developed, but it was thought best to integrate them in the system. Indeed, some fishing vessels are multi-purpose so fishing firms enjoy more flexibility by holding non-territorial fishing rights. The ITQs have most characteristics of private property rights; they are exclusive, divisible, transferable, and permanent (Arnason, 1990). The system has worked much better than other management schemes in world fisheries (Gissurason, 2000). Since an individual fishing firm holds a right to extract a certain share of the TAC in a certain species of fish, it does not only have an incentive to minimise the cost of harvesting this share, but is also interested in the long-term profitability of the resource: since 1991, the Icelandic fishing community

has consistently advocated a cautious setting of TACs. But the system is by no means perfect. One imperfection is the result of the nature of the fishing right. Over a season, it is expressed in metric tonnes, MT. But if much of the catch consists of inferior specimen of the targeted species, or of non-targeted species, there is an incentive to throw it away. This is what is called highgrading and bycatch. It is however not a big problem in Iceland, and the theoretical solution would be to issue different quotas for specimen of different quality of the same species and to make the quotas in different species easily transferable (the latter is in fact done in Iceland). Other imperfections could be eliminated by simple legislative changes. First, the Minister of Fisheries usually sets the TACs on biological considerations, to maximise catch, not profit. It would seem desirable if self-management by the fishing community could replace this kind of political management. Secondly, some small boats are still outside the system and various measures have been undertaken to placate their owners, at the cost of the commercially more successful owners of bigger vessels. Thirdly, there are some restrictions on quota transfers, for example a maximum quota which each firm can hold, and the quotas are also tied to vessels, and so only transferable between them. Fourthly, and most importantly, there has been a reluctance to recognise the ITQs as at least akin to private property rights. It is not permitted, for example, to use them as collaterals although banks circumvent that problem by writing into contracts that vessel owners cannot transfer quotas from vessels held as collaterals, without the consent of the banks. The uncertain legal status of ITQs is the greatest remaining problem of the Icelandic system.

A Quota Auction?

THE reason why the Icelandic legislature has been unwilling to develop ITQs into private property rights is the widespread resentment over the fact that rent—previously dissipated in excessive harvesting cost in fisheries—is now being captured by quota holders, i.e. owners of fishing vessels. Slowly, a change has been taking place in the fisheries. In quota transfers, those who want to remain, are buying out those who want to cease fishing. Some economists would argue that is precisely what was needed: over-investment, an ever-increasing number of vessels chasing declining fish stocks, has been replaced by divestment, a reduced number of vessels harvesting healthier fish stocks. But when the ITQ system in the demersal fisheries was first introduced, in 1983, and long thereafter, there were economists who suggested that the necessary divestment should be brought about by government auctioning off the quotas instead of allocating them on the basis of catch history (Gylfason, 1990). Similar arguments can be made against this proposal as to Warming's idea of access fees to individual fishing grounds. The problem is however not being correctly analysed, i.e. the mutually harmful effects of the economic activities of fishermen, in the absence of properly defined fishing rights. The rent dissipated is rent lost by fishermen, because of open access. The remedy is not to replace the loss of rent by excessive harvesting cost by the loss of rent by government charges. The auction scheme seems to be a failure to realize that the dissipation of rent is an externality for the fishermen, i.e. owners of fishing vessels. Possibly the reason is that the externality is invisible and can only be brought out by economic analysis (Buchanan, 1997). Compare it with the externality in the radio industry, discussed above. There the externality is

obvious. It consists in the interference when somebody starts to broadcast close to one, both in terms of location and frequency. The externality in the fisheries is however rent foregone, rent dissipated. But it would seem natural to improve the rules in such a way that the fishermen could internalise this externality, not leaving them just as badly, or worse, off as previously.

This point can be approached from a different angle. Nozick's justice in initial acquisition required that others were not made worse off by the intended acquisition. This is similar to the criterion for a Pareto-optimal institutional change (Buchanan, 1959): that some would be better off, and that no-one would be worse off, by the change. It is obvious that some will be better off and that nobody would be worse off, by initially allocating the ITQs to fishing vessels on the basis of catch history. What would then happen—and what in fact happened in Iceland—would be that over time quotas would be transferred from those who wanted to leave the fisheries to those who wanted to continue, for example because they were young and strong, or more enterprising, or more efficient. Both groups would be better off, those who sold their quotas and those who bought quotas and remained in the fisheries. Government, and the public, would also be somewhat better off, because of a more efficient utilisation of scarce resources: there would be a gain to others in the excess capital released from the fisheries. However, it would have an unjust initial acquisition (by government) in Nozick's sense, and not an optimal institutional change in Pareto's sense, if the ITQs had initially been allocated in an auction where inability to pay a certain price would have brought about the required reduction in the fishing fleet. In that case, government would have been better off; those who were able to buy quotas would have been more or less as well

(or badly) off as before, the difference being that they would be paying government for the quotas what they previously had been investing in excessive fishing capacity; those who were unable to buy would have been much worse off because they would have had to leave the fisheries and lose, without compensation, both their physical and human capital, acquired over many years and quite specific to the fisheries. Politically, of course, the choice was between buying the fishermen out, or driving them out. Initial allocation on the basis of catch history made the necessary adjustment slower and smoother, and therefore feasible. The rent which gradually emerged, and had previously been dissipated, could be used to buy and sell quotas and facilitate the change. It is true that others—those with no catch history—were being excluded. But it has to be emphasised that the cost of locating or entering an industry is usually lower than the cost of relocating or leaving one industry and entering another (Demsetz, 1988). Moreover, the choice which potential newcomers were deprived of was the worthless one of being able to participate in a race to drive profits down to nothing by excessive fishing effort.

Pigou and Samuelson on Non-Exclusive Resources

PRIVATE property rights are still quite controversial, not least among political philosophers. Rawls (1971) did not even believe that people had property rights in personal assets, such as their talents and abilities, and in the income or rent which those assets could bring them in free exchanges in the marketplace. Rawls' main argument against individuals enjoying the rent derivable from their personal assets was similar to that which

George (1880/1951) used against landowners collecting the rent derivable from land: it was that their initial distribution was morally arbitrary. It is against such theories that Nozick developed his entitlement theory of justice: people may be entitled to goods if they have come to hold them in ways which did not make others worse off. But for the purposes of this paper, two tales told by economists sceptical about “unfettered market exchanges” are instructive. They are both based on the same analysis as that of Warming on two fishing grounds of different fertility. Pigou (1912; 1920) told of two roads of different quality between the same two cities, one road being narrow and good, the other one being wide and bad. He demonstrated that traffic would be misallocated between the two roads: truckdrivers would move to the better road and cause congestion. The “rent” which could be derived from the superior quality of the better road would be dissipated in the form of congestion. To correct the situation, Pigou proposed, just as Warming had done, access fees: government should charge a toll for the use of the narrow road, reflecting its superior quality. But Knight (1924) pointed out that Pigou had overlooked a possible solution. If the better road was privately owned, its owner would charge the appropriate price for its use. Pigou quietly dropped the example from later editions of his work. But the Pigovian image of government as an auctioneer ensuring by tolls and taxes that all scarce goods are properly priced, not leaving this to participants in the market process under a framework of well-defined property rights, may have been in the minds of the Icelandic economists who wanted government to auction off the ITQs.

Samuelson (1974) told of two plots of land of different productivity, both plots being utilised as communal property

by the six inhabitants of a village. He demonstrated, with the same arguments as Warming and Pigou, that the better plot would be over-utilised and that the net social product would thus be reduced in the absence of rent collection, i.e. pricing the two plots according to their different productivity. However, Samuelson also showed that if the rent was collected by a “landlord” and not by the village community (which would have redistributed the rent to the inhabitants), then wages in the village would go down. He concluded that Marx had been right that enclosures of commons might actually worsen the conditions of labour, even if the capitalists would gain by it and the net social product would increase. But Samuelson’s analysis does not show, as he seemed to think, that privatising the two plots would make the villagers worse off. If the two plots were divided up into six equally valuable plots (of unequal size) and transferred to the individual villagers, and not to outsiders (e.g. government), then those villagers would surely benefit and the net social product would increase. This would be initial allocation by homesteading or the principle of first occupancy, quite similar to the allocation of radio frequencies which was taking place by court decisions in the U.S. until Congress stopped it in 1927, and also similar to the initial allocation of ITQs in Iceland on the basis of catch history. A scheme of rent collection by the village community, with a mechanism of redistribution to the inhabitants, was unnecessary. Moreover, it is not plausible, in Samuelson’s example, that the potential rent of land would be equal under communal and private ownership. There would be much stronger incentives under private ownership to search for new and more profitable ways of utilising the land.

The Case for Private Property

IN this paper, it has been argued that private property rights are applicable, and have indeed been applied, in many areas outside the traditional ones of land and cattle and other visible and tangible goods. There were no technical obstacles to private property rights in radio frequencies, and such rights were quickly emerging, when the U.S. Congress stopped the process. Neither were there any technical obstacles to private property rights to certain resources on the coast, such as the right to lay eel traps in Denmark, even if the Danish legislature abolished the rights and thus reintroduced the problem of open access in the eel fishery. When the resource in question occurs on such an immense scale that no sole owner can enclose it economically, like Icelandic mountain pastures, salmon rivers, and fishing grounds, individual rights can be combined with a communal management of the resource. The examples illustrate Demsetz' account of private property rights emerging in response to new scarcities and externalities, and enabling participants in the economic activities in question to internalise these externalities. Also, the examples clearly show that there are two sides to the emergence of private property rights as means of internalising externalities. There is the demand side, well-described in the extensive literature on the economic need for, and benefits of, private property rights. But there is also the supply side. There has to be some political support for the appropriate legislation, or at least for non-intervention by the legislature, when a situation of open access is changed into one of exclusive rights held by individuals. In the U.S., the radio spectrum was declared public property in 1927. In Denmark, the farmers' exclusive rights in the eel fishery were abolished

under pressure from the eel fishermen. In Iceland, there is still strong resistance to the ITQs being recognised as full private property rights (surprisingly, partly coming from economists, cf. again, Gylfason, 1990).

Private property rights can be supported by political and social arguments as well as economic ones. By enabling people to internalise externalities, or reduce harmful effects of economic activities to a tolerable minimum, they create better general conditions for peace in society. They bring, in other words, about the spontaneous coordination of economic activities, the mutual adjustment of individuals which is one of the clearest signs of a civilised society. Private property rights also direct aggressive instincts into channels acceptable and indeed beneficial to others. It has been observed that man is seldom so innocently employed as in making money; and that it is better that a man should tyrannise over his bank account than over his fellow citizens. The transfer of natural resources into the hands of individuals creates an increased sense of responsibility; the resources are taken into custody, as it were; their owners become their custodians; and if they are inefficient in utilising them, they will sooner or later lose them: a fool and his resource are soon parted. Property enables people to take the future into account, to take the long-term view. Consider endangered species. Why are sheep in Iceland not in danger of becoming extinct like elephants in Africa? The difference is that the sheep are owned. Somebody is responsible for them, brands them or fences them off. It has been said that one of the greatest problems in Russia is that there was never a tradition of private property rights in natural resources, even before the communist era (Pipes, 2000). It has also been contended that in the less developed countries

much capital is “invisible”: it cannot be properly registered or transferred. Improvements on it will not always directly benefit its holders; therefore, such capital does not grow at the same rate as capital in more developed countries (de Soto, 2000). It is true that in a society of private property rights there will be some people vastly richer than others. Rarely mentioned, however, are the (undoubtedly unintended) benefits of rich people: they reduce the cost of the free market’s experimental process by consuming goods which are very expensive in the beginning, and become much cheaper in the process, such as the car, the television set, the video recorder and the personal computer. Men of independent means provide some resistance to the potential tyranny of petty officials. They can take off the time, and command the resources, to fight them, before the courts and in the media. It is also more than likely that a group of 100,000 capitalists will provide more risk capital than 10 investment funds controlled by political appointees. While rich people certainly create some resentment, in a strong and vibrant economy, with much upward social mobility, such people also create hope and encouragement. Most importantly, what explains the creativity, and ultimately the ever-improving living standards in capitalist countries, is the ability of people to experiment with, innovate on, combine or divide, buy or sell, their property.

Objections to Individual Transferable Quotas

IN preparation for the 2002 review of the Common Fisheries Policy, CFP, the European Commission did a survey of 350 organisations and associations with an interest in fisheries, in all the member states of the European Union (Nordmann, 1999). In the survey, a majority turned out to be against the assignment of individual transferable quotas, ITQs, to fishing firms. Their objections to ITQs were mainly: a) the difficulty of their initial allocation; b) their inability to hinder overfishing; c) monitoring problems; d) their impracticality in multi-species fisheries; e) their eventual concentration in the hands of a few fishing firms; f) their incompatibility with values such as equal access and shared resources. To this may be added yet another common objection to ITQs: g) their inapplicability to international fisheries as many fish stocks are fugitive resources. In this paper, those seven objections will be discussed in the light of the Icelandic experience with ITQs over the last quarter of a century.

Overfishing 1945–83

IN 1975, Iceland extended her EEZ to 200 miles. This meant that she could begin managing her fertile fish stocks. Between 1945 and 1975, with the introduction of ever more efficient fishing gear, and practically no restrictions on access to the Icelandic fishing grounds, the Icelandic fishing fleet grew

at a much faster rate than the total catch. This was a clear example of economic overfishing—investing excessive capital in the harvesting of fish, i.e. over-capitalisation. There was also biological overfishing—exceeding the maximum sustainable yield, MSY, of a given fish stock. One of the most commercially important species at that time was herring which roams in large schools over vast areas of the sea, near the surface. After the great “herring boom” of the mid-1960s, the stock collapsed in the late 1960s, until a moratorium was declared in 1972. Harvesting of herring resumed in 1975, but on a much reduced scale. Iceland now decided to set a TAC in herring over the annual fishing season and to divide this TAC equally between the herring boats in operation. To simplify somewhat: if there were 100 herring boats, then each received a quota of 1% of the TAC in herring; if the TAC for a given fishing season was set at 300,000 metric tonnes, MT, then each boat were allowed to harvest 3,000 MT over that fishing season.

In essence, this was an enclosure of the herring stock. Owners of fishing vessels in the herring fishery did not resist this for three main reasons. First, they were mindful of the collapse of the stock in the late 1960s. In the second place, the herring boats were all of roughly the same size, and with a similar catch history: initial allocation of individual quotas was therefore non-controversial; owners of boats each received the same individual vessel catch quota, a share in % in the TAC. Thirdly, there were no special local interests: the fleet chased the herring all over Iceland’s territorial waters and even out of it. Soon, the boat owners realized their gain in being able to transfer quotas between themselves. Consequently, in 1979 the individual herring quotas were made transferable. A system of ITQs was now in place in the herring fishery, arguably one of the first

such systems in the world (Gissurarson, 2000). Interestingly, in the Lake Winnipeg fisheries, originally developed by Icelandic immigrants to Manitoba in late 19th century, individual quotas have been issued since 1972, and made transferable in 1986 (Gislason, 1999). The other important pelagic species of fish in Icelandic waters is capelin, harvested in much the same way as herring. In 1980, individual vessel catch quotas were introduced in the capelin fishery, and in 1986 they were made transferable.

However, the demersal species of fish in Icelandic waters, first and foremost cod, but also redfish, halibut and other species, are commercially more important. Relatively territorial in nature, cod and other demersal species are found in feeding grounds near the bottom of the shallow continental shelf around Iceland. It became apparent soon after the extension of Iceland's exclusive economic zone in 1975 that the cod stock was declining. But how was access to be restricted? The demersal fisheries differed from the pelagic ones in two important respects. They were based on local fishing grounds, close to some fishing towns (where fishermen perceived their interests to be different from those of fishermen in other towns); and the fishing fleet was quite diverse in nature, consisting of large factory trawlers through mid-size multi-purpose vessels down to small boats, even undecked rowboats. Those two facts about the demersal fisheries meant that initial allocation of individual quotas was potentially much more controversial than in the pelagic fisheries. Indeed, in 1977–83 Iceland tried to manage the demersal fisheries by restricting effort directly, i.e. by setting a TAC and deciding on a number of allowable fishing days over the season with the aim of reaching this TAC. Predictably, this started a competitive rush to harvest as much

as possible during the allowable fishing days. Vessel owners in the demersal fisheries invested in ever greater fishing capacity, and the already too large fishing fleet became larger still. Meanwhile, the number of allowable fishing days went down dramatically, for large trawlers in the cod fishery, for example, from 323 in 1977 to 215 in 1981. The system was also difficult to monitor, real total catches usually exceeding TACs by far.

A Comprehensive ITQ System 1983–2001

WHEN it became clear in 1983 that the effort restrictions were not working, the Icelandic government, supported by the majority of fishing vessel owners, decided to experiment with individual vessel catch quotas in the demersal fisheries, similar to those previously issued in the pelagic fisheries. Resisting this was a strong minority of vessel owners and their crews from towns close to the most fertile fishing grounds (who preferred restrictions in terms of effort rather than catch) and owners of small boats. From the beginning of 1984 individual vessel catch quotas were issued in the demersal fisheries, as shares in % in the TAC, on the basis of catch history for the previous three years. They soon became transferable, and in 1990 a comprehensive law was passed under which such quotas were issued in all Icelandic fisheries without any time limits at all, and with few and insignificant restrictions on transfers. Expressed in percentages of the TAC, the quotas are called TAC-shares. Expressed in the allowed catch in MT over a given fishing season, they are called Annual Catch Entitlements, ACEs,—the ACE of a vessel being a simple multiple of the TAC over the season and the vessel's TAC-share. The law began to apply in 1991 (Gissurarson, 2000).

Since then, the ITQ system in Iceland has worked tolerably

well. Despite the reluctance of owners of fishing capital to divest (both because they hope for stronger existing stocks in the near future and because they want to be ready if new stocks appear inside or outside Icelandic waters), the fishing fleet has been somewhat reduced. However, fishing effort has been reduced much more, especially in the pelagic fisheries (Runolfsson, 1999). Moreover, fishing firms have become fewer, bigger and more efficient. It is significant that in 1990, total catch by the Icelandic fishing fleet amounted to 1,502,000 MT, while crews in the fishing fleet numbered, on average, 6,500. In 1999, on the other hand, total catch amounted to 1,730,000 MT, while crews numbered, on average, 4,400 (Stacice, 2000). The ITQ system in Iceland is quite similar to the system in operation in New Zealand (Major, 1999) and the Netherlands and in individual fisheries in Canada, Australia and some other countries. When the massive over-capitalisation of fisheries all around the world is observed, one might wonder why such a system is not more common. But the real question should be why such a system exists at all. The reason is that owners of fishing capital are likely to resist strongly the restriction of their traditionally free access to the fisheries. This leads directly to an objection to ITQs made by many organisations and associations in the EU survey mentioned above: the difficulty in their initial allocation.

The Difficulty of Initially Allocating ITQs

THE answer to the objection that it is difficult initially to allocate ITQs is that precisely because of that, agreement has to be reached with the owners of fishing capital—those who make the decisions and bear the risks—on how to restrict access to the fisheries. The owners of fishing capital, whether large fishing firms or individual fishermen, have to be partners

in any change in the system under which they harvest. There is one clear principle on which ITQs could be allocated initially so that resistance to them would be minimised: in such a way that no fisherman would be worse off, and at least some better off (Buchanan, 1959). This means recognising existing interests and entitlements. Consider the alternative means of restricting entry in the fisheries, proposed by a few economists in Iceland in the sometimes heated discussion about fisheries management in the 1980s (Gylfason, 1990). This proposal was for government to auction off individual quotas to the fishing vessel owners, because thus they would not be deprived of anything: Instead of wasting large sums of money on excessive fishing capacity and effort, the vessel owners would be using the same sums of money to pay for individual quotas. The rent from the fishing grounds, previously dissipated in over-capitalisation, would simply be captured by government. But while as a whole, the fishing community would not have been worse (or better) off, many individuals within it would have been worse off, namely those driven out by their inability to pay for the quotas in a government auction. Therefore, this proposal was clearly unacceptable to the fishing community, to vessel owners as well as to their crews. On the other hand, receiving individual quotas on the basis of catch history, i.e. maintaining their share of the total catch over a previous period, would not have meant a radical change for them. Therefore, grudgingly, they could accept this, as they indeed did.

When the individual quotas were made transferable, soon after their initial allocation, a process was initiated by which fishing effort was gradually, and peacefully, reduced. Those who for whatever reason wanted to continue harvesting fish (for example and most commonly, because they were more

efficient), could buy individual quotas from those who wanted to leave the fisheries; they could then transfer the quotas to their vessels and consequently plan their harvesting operations more efficiently. The less efficient fishermen were bought out by tempting offers of money for their quotas, not driven out by their inability to pay for quotas in a government auction. Neither group could complain, those who chose to remain in the fisheries, and the others who chose to leave at a freely negotiated price. This was also a process over time, enabling the crews that lost their jobs to enter the labour market ashore. It was the transferability of individual quotas which enabled those operating under the system to move from less to more efficiency. It is true that the end result was more or less the same as if the quotas had been initially auctioned off by government. The difference was that the process took longer and that no stakeholder in the fisheries—nobody with an existing interest in harvesting fish—became worse off. What happened was that those who had been utilising the fish stocks became owners of use rights to those stocks. They gained, while nobody else lost anything except the less than meaningful right to participate in a competitive and costly rush to harvest fish until the possible profit had fallen to zero—as will usually be the case under free entry. In other words, what happened was that a natural resource which had been treated as a free good, and therefore over-utilised, now became a capital good. It was difficult enough to develop the ITQ system in Iceland, and it would have been virtually impossible to develop it if the vessel owners had not received their initial shares in the TAC free of charge. Indeed, owners of some small boats still manage to stay outside the Icelandic system. They operate under effort restrictions, i.e. a given number of allowable fishing days.

Problems in Administering an ITQ System

THE development of the Icelandic system of ITQs shows that their initial allocation, to the tolerable satisfaction of the fishing community, has been difficult, but not impossible. But what about the practical problems mentioned in the EU survey? Under a system of ITQs, will the TAC be set in such a way that there is no danger of overfishing? How can individual vessels be monitored so that they do not exceed their assigned quotas? In particular, how will bycatches and highgrading be dealt with under an ITQ system? And what about multiple-species fisheries? The response to the first problem, that of overfishing, is clear. In Iceland, owners of fishing vessels now fully support a cautious setting of TACs in different species. They have become ardent conservationists. This is hardly surprising. The advantage of an ITQ system such as the Icelandic one is precisely that the private interests of individual fishermen coincide with the public interest. Holding a right to harvest a given share in the TAC in a given fish stock, owners of fishing capital want to maximise the long-term profitability of this fish stock. The change from a system of free entry to that of entry restricted to holders of ITQs amounts to taking the fish stocks in the Icelandic waters into custody and making the owners of fishing vessels their custodians. ITQs have some of the most important characteristics of private property rights, such as durability, exclusivity, divisibility and transferability, and they serve to a large extent the same economic function as such property rights (Scott, 1999).

At present, TACs in different fish stocks in Icelandic waters are set each year by the Ministry of Fisheries for the next fishing season on the recommendations of the Marine Research

Institute, MRI, and after consulting with interest groups. After the ITQ system became comprehensive in 1991 the advice of the MRI has usually been followed quite closely. It is based on biological rather than economic considerations, with the aim of approaching the maximum sustainable yield, MSY. The advice of the MRI on the MSY in each species has been as good as the available scientific knowledge allows. The fish stocks in the Icelandic waters have strengthened somewhat in the 1990s, but in mid-year 2001 it emerged that the MRI had somewhat overcalculated the strength of the cod stock. Therefore the TACs in cod for the next few years have to be set lower than previously expected. It should be pointed out that this mistake is not a reflection on the ITQ system but rather on the limitations of marine biology, a very complex and difficult discipline.

When the traditional economic model of a fishery (Gordon, 1954) is analysed, as in Figure 1, it can be seen however that the MSY (with a fishing effort of 10 boats in the example in Fig. 1), should not really be the aim. Instead, it should be the maximum profit (the greatest difference between total revenues and total costs; with a fishing effort of 8 boats in the example in Fig. 1) which will practically always mean a lower TAC than if the aim is MSY. Putting it differently: it is not revenue (i.e. catch) which should be maximised, but profit. It should therefore not unduly worry Icelanders if the TAC in cod has to be reduced in the next few years. However, in the long run it would probably be best to move decisions on TACs from the Ministry of Fisheries to the Association of Icelandic Fishing Vessel Owners: they have a direct, clear interest in trying to set TACs responsibly. It would be a step from the management of fisheries to their self-management (Scott, 2000). Indeed, it

The Icelandic Fisheries: Sustainable and Profitable

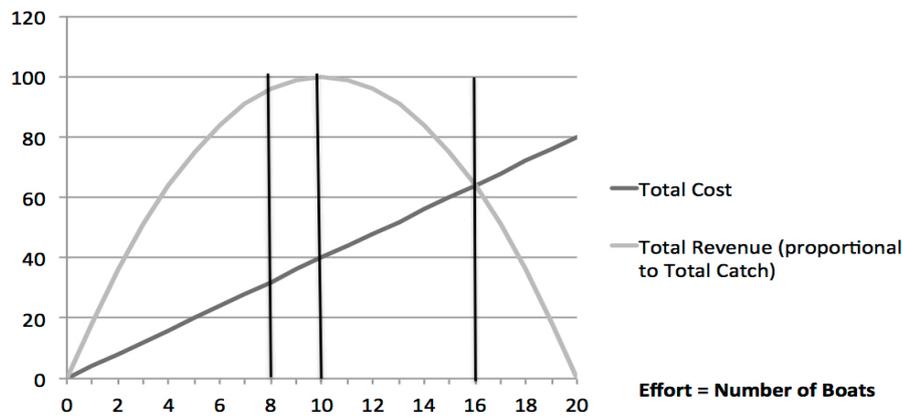


Figure 1

can also be demonstrated that the TACs can be set without having to process all the (sometimes unreliable) biological and economic data which can in theory be collected about the fish stocks (Arnason, 1990). The TACs should simply be set in such a way that the market value of the ITQs will be maximised.

Monitoring is neither difficult nor expensive under the Icelandic ITQ system. The Fisheries Directorate, FD, manages the system, mainly by controlling landings. All catch is weighed and its species composition recorded in special weighing stations in the 67 ports of Iceland (and in foreign ports as well). These data are fed into a computer at the FD which makes them available to holders of individual quotas who can check their catch status at any time. The FD also records quota transfers. All these data are posted daily on the FD's homepage on the Internet. The Icelandic Coast Guard monitors fishing vessels at sea and enforces regional closures when they are deemed necessary by the Ministry of Fisheries. The administrative costs

of the ITQ system in Iceland are relatively small, about US\$30 millions a year with a total catch value, in the late 1990s, on average about US\$800 millions a year.

It is true that the Icelandic fisheries are much more complex than the simple (but illuminating) model in Figure 1 would suggest, not least because they are multi-species. This fact does not however make their management by means of ITQs impossible. Consider the much-discussed problems of discarding: bycatches and highgrading. They are caused by the fact that, over a fishing season, quotas have to be expressed in metric tonnes, MT, whereas the values of two such tonnes need not be equal, either because they come from different species of fish or because specimens of one species differ in value. Bycatches—throwing away non-targeted species—are not much of a problem in the Icelandic fisheries because quotas in one species are easily transferred to quotas in another species. The TAC-shares in different fish stocks are interchangeable: cod is the common denominator of the system, the term “cod equivalent” denoting the relative market value of different species of fish, as determined by the Ministry of Fisheries each year. For example, in the 1998–9 fishing season the values were 1.00 for cod, 0.70 for redfish, 2.15 for Greenland halibut, 0.09 for capelin, 0.14 for herring and 8.55 for nephrops (lobster). The bycatch is therefore of value to the vessel owner. It is only if the cost of carrying it is higher than its market price that there is an incentive to discard it.

Highgrading—throwing away specimens (usually younger and smaller) of the targeted species—is a greater problem. According to one estimate, in Iceland it ranges from 1 to 6% of total catch, depending on types of gear and vessels (Arnason, 1994). It does not however seem to be on the increase since the

ITQ system became comprehensive in 1991. A possible means of minimising highgrading might be to issue different quotas in the same fish stock and to make them interchangeable: the vessel owner has to regard it as a real cost to discard the less valuable specimens of the species. If this is not feasible and until technology makes it possible to differentiate in harvesting rather than in landing between specimens of different values, strict surveillance of harvesting, e.g. by video cameras and observers onboard, seems the only feasible solution of this problem.

Fisheries in International Waters

It is interesting how Iceland has dealt with fisheries partly or wholly outside her EEZ, shown in Figure 2. Some species of fish harvested by Iceland's fishing fleet straddle her EEZ, like oceanic redfish in the Irminger Sea southwest of Iceland; or they migrate in or out of it, like herring and capelin; or they are wholly outside the EEZ, in international waters, like deep-sea shrimp found in the "Flemish Cap" east of the Canadian EEZ and cod in the "Loophole" between the EEZs of Russia and Norway. On the oceanic redfish in the Irminger Sea, Iceland negotiates an annual TAC, and her share in it, within the Northeast Atlantic Fisheries Commission, NEAFC (the members of NEAFC being Iceland, the Faroese Islands, Norway, Russia and the European Union). Since 1997, Iceland's share in this TAC has been allocated to individual vessels on the basis of catch history (the three best years of the six years in which this fishery had then been operated, with 5% of the total reserved for those who had started the harvesting, a so-called pioneers' quota). On the Atlanto-Scandian herring, which suddenly reappeared in the Northeast Atlantic Ocean in



Figure 2

1994 after the collapse of the late 1960s, Iceland also negotiates a TAC, and her share in it, within NEAFC. For the first few years, in 1994–7, entry was free each year until Iceland’s total share had been reached, but since 1998 Iceland’s share has been allocated to individual vessels on the basis of the then established catch history (and also to some extent, of vessel hold capacity).

On capelin, mostly found in Icelandic waters, Iceland negotiates with Greenland and Norway an annual TAC, and her share in it. Iceland’s share is then allocated to individual vessels on the basis of catch history. On the deep-sea shrimp in the Flemish Cap, Iceland has refused to participate in an agreement made by the North Atlantic Fishing Organisation, NAFO, because NAFO tries to control entry by restricting

effort, i.e. allowable fishing days, while Iceland wants to control entry by restricting catch, i.e. by an ITQ system. Since 1997, Iceland has therefore unilaterally set a TAC for her own vessels in the Flemish Cap and allocated it to individual vessels as ITQs on the basis of catch history. In the cod fishery in the Loophole where Icelandic vessels operated in 1993–9, Iceland has not implemented any rules of her own. Disputed both by Norway and Russia, harvesting by Icelandic vessels in the Loophole ceased in 1999 under a treaty between those two countries and Iceland.

Consider also the CFP of the EU which combines the EEZs of the member countries into a common pool, thus making it somewhat similar to international waters. Within this common pool, TACs are set in individual fish stocks and the share of each member country in them determined. Since 1972, the Dutch have allocated their share in the TACs of some demersal species in the North Sea as individual quotas, made transferable in 1985 and comprehensive in 1994 (Davidse, 2000).

An efficient management of fisheries in international waters certainly seems possible. Countries with an interest in harvesting fish stocks in those waters simply have to negotiate a TAC in those stocks and the share of each country in that TAC. Then each country can allocate its share in whatever way it wants to, where most economists would probably suggest ITQs, held by private fishing firms. While an efficient management of international waters may thus be possible, it does not mean that it is likely to be introduced in the near future. Coastal countries on the one hand and countries with fisheries in distant waters on the other hand may, for example, perceive their interests to be quite divergent (just like fishermen in towns close to the most fertile fishing grounds in Iceland thought, in the 1980s,

that their interests were different from those in other towns). The Icelandic experience suggests that the most difficult issues might be, neither the setting of TACs nor the monitoring of harvesting: once owners of fishing capital gain an interest in the long-term profitability of the resource, they will support a cautious setting of TACs and engage in monitoring one another. The most difficult issues might be how to reach an agreement between those countries concerned on their relative share in it, how to exclude other countries from harvesting, and how to reach an agreement within each country on the allocation of its TAC-share. It is most likely that such issues could only be settled on historical principles, i.e. by recognising the interests that individual firms and countries may have gained by engaging in harvesting fish in international waters. The easiest way to introduce ITQs in international waters is to change such interests into well-defined rights and to make those rights transferable between individual firms of different nations. Then fishing firms from different countries will be able to trade their problems away instead of having to put pressure on their governments to fight them out.

Concentration of Quotas

A common argument against the assignment of ITQs to individual fishing firms, stated in the EU survey, is that it will lead to the concentration of the quotas in a few big fishing towns and in the hands of a few large fishing firms. Fishermen on small boats will slowly, and sadly, disappear; and as quotas are transferred, some fishing villages will lose almost their entire means of livelihood. While ITQs may be efficient from an economic point of view, their regional impact and social consequences are neglected, or “undertheorized”

(Pálsson, 2000). The Icelandic experience has however been somewhat different. The country can be divided into seven main regions. In the 20th century, there was a continuous migration of people from other regions to the Southwest—to the capital city of Reykjavik, and its environs. Regional policy in Iceland traditionally has had the aim to strengthen the economy in the other regions in order to halt this migration. What is interesting here is that the Southwest, which in 1984 (the first full year of individual vessel quotas in the demersal fisheries) held 29.7% of the total quotas (in cod equivalents), in the fishing year 1998/9 only held 25.7%. There has been a net quota transfer to three regions, the West, the Northwest and, in particular, the Northeast and an almost negligible net quota transfer from another three regions, the South, the Western Fjords and the East. On the distribution of demersal landings by regions, the story is similar except that there was a slight increase in landings in the Southwest; one reason for this being that the freezer trawlers where fish processing is essentially moved aboard are mainly located in the Southwest and the Northeast. Nevertheless, the fact remains that there has not been a significant transfer of resources to the Southwest, as was feared in the first few years of the ITQ system. On the contrary, the ITQ system seems to be accomplishing what numerous regional funds in Iceland never could: to provide people in the fishing villages scattered along the coastline with feasible economic opportunities. It is noteworthy that about 75% of the quotas are held outside the Southwest, while about 75% of the people reside in the Southwest.

It is true that there has been a concentration of quotas in the hands of the largest fishing firms. In the fishing year 1991/92 the ten largest firms held 24.6% of the demersal

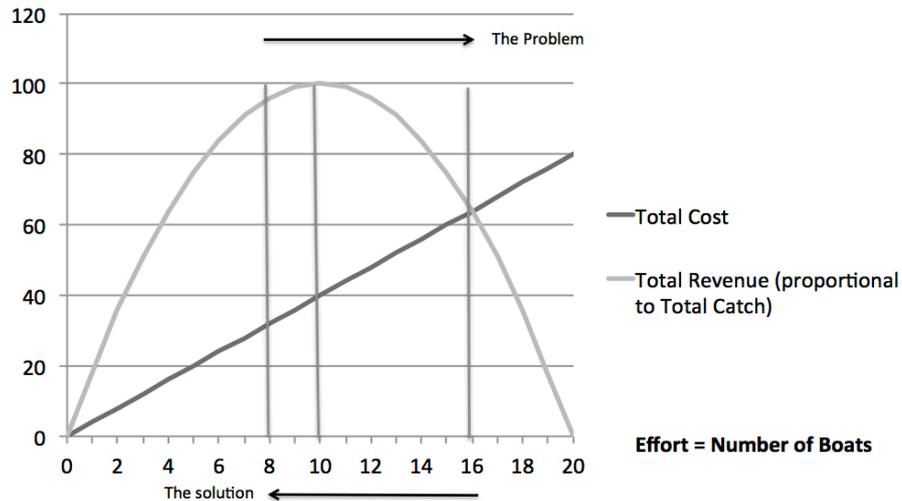


Figure 3

quotas, whereas in 1998/99 they held 37.6%. This was only to be expected. Moreover, one might argue that it was indeed desirable. Consider again Figure 1 earlier, or Figure 3 here: the traditional model of a fishery. Under free entry, in this fishery effort will increase, i.e. boats are added until all profit has disappeared (according to the figure, at 16 boats). The aim of fisheries management is to reduce the size of the fleet from 16 to 8 boats (as already emphasised not to 10 boats, because what should be maximised is not revenues but profits). This will almost inevitably, and desirably, mean some concentration: there were too many boats, and the task was to reduce their number. What is important in the Icelandic fisheries is that no fishing firm holding quotas is in a dominant position. The two largest firms in the demersal fisheries each held only 5.5% of the demersal quota in 1998/9.

Another fact that needs to be pointed out when the relative strengthening of the largest fishing firms is observed, is that those firms have become public corporations and have in that way come under the ownership of many more people than before. The reason that many of them could increase their share of the total quota was to a great extent precisely that they transformed themselves from small family-owned companies into large public corporations selling shares in themselves in the marketplace. The new owners, often numbering thousands of people, brought in the capital necessary to increase their share of the total quota. In 2001, there were about 20,000 shareholders in Icelandic fishing firms (out of a population of about 280,000). Therefore, at the same time as the quotas are in the hands of fewer firms than previously, those very firms are in the hands of many more people. It is likely that in this sense the quotas are in the hands of many more people than they were when originally assigned in the demersal fisheries at the beginning of 1984.

Equal Access and Shared Resources

IN the EU survey, referred to in the Introduction, one of the main objections to ITQs was that they were incompatible with community values such as equal access and shared resources. This is undeniably true. The assignment of ITQs to certain firms in a given fishery means that others are excluded from harvesting there. ITQs are indeed exclusion rights. But this is precisely their point. Overfishing under a system of free entry occurs because those already harvesting have no means of excluding those entering the fishery. Consider Figure 3 which is basically the same as Figure 1: maximum profit in this fishery will be at a fishing effort of 8 boats. But under free

entry fishing effort will increase until no profit is to be made from the fishery, namely at a fishing effort of 16 boats. This is clearly a cause of harmful effects of economic behaviour, or an “externality” in the economic sense: the fishermen impose a cost on one another in the form of over-capitalisation (Coase, 1960). The cost consists in profit foregone, in dissipation of the possible rent from the resource, in operating 16 boats instead of 8. Access to a resource has to be “unequal”, if the resource is to be efficiently exploited. This is what private property rights in general are about. Similar considerations apply to values such as shared resources.

So, this objection is true, but irrelevant. However, underlying it is probably a different consideration. It is that the initial allocation of exclusive rights to a resource is bound to be highly problematic. It will only be some who receive those rights: there will be a division of people into two classes, the owners of quotas on the one hand and a dispossessed proletariat on the other. Why did only the vessel owners receive ITQs in Iceland, but not their crews, or even the general public? Why, in essence, were the vessel owners allowed to appropriate this valuable resource, the fish stocks in Icelandic waters? One obvious answer is that it was they who made the decisions and took the risk. It was they who faced the externality; it was they on whom the cost was imposed. Their crews did not face any such externality: they simply sold their labour and their income was presumably determined by competition in the labour market; they could just as well have sold their labour ashore. Compare over-capitalisation with another more familiar externality such as a factory emitting a foul smoke over a town. People realize that this is an externality because they can see and smell the smoke; it is irritating to them. The solution in this case would

be to “internalize the externality” by enabling those concerned to trade with one another, e.g. by requiring the factory to compensate the inhabitants of the town fully for the pollution (which would also induce the factory to seek other ways of disposing of the material presently emitted as smoke). But there are two important differences between the foul smoke from the factory and over-capitalisation in a fishery. First, people do not always recognise over-capitalisation as an externality, because they cannot smell any smoke, or hear any noise; the externality can only be brought out by economic analysis; it consists in profit foregone, in rent dissipated (Buchanan,1997). In the second place, the factory pollutes the air in or near the town, whereas the fishermen impose the costs on one another. But in both cases, the solution is essentially the same, to “internalize the externality” by enabling those concerned to trade with one another. It would be somewhat strange if government stepped in and appropriated the profit foregone instead of allowing those utilising the resource to enjoy it. Then the situation would not have improved for any of the fishermen: it would only have improved for government.

Another reason why owners of fishing capital were the natural recipients of the ITQs in Iceland has already been stated: while their acceptance and cooperation would be crucial in introducing any scheme of management, they would never have accepted the change from a system of free entry to that of restricted entry, unless they themselves received the rent, or a large part of it, derivable from the change. It was necessary to reduce the fishing fleet, and the peaceful way to do it was to give quotas to all in operation and to allow some of them to buy the others out. Thus, relative stability was ensured. A related point can be made in terms of adjustment costs. There

was a group of people (vessel owners) who had invested much capital, both physical and human, in the fisheries, and there was another group of people (the rest of the population) who had the nominal right to enter the fisheries, but who had not invested anything there. Then, entry had to be restricted. Surely it would have cost those inside much more to have to leave than it would have cost those outside to be deprived of their right to enter (only to participate in a competitive and costly rush to harvest fish until the possible profit had fallen to zero). There was an asymmetry between the situations in which those two groups found themselves; and this asymmetry made it natural to allocate the ITQs initially to those with a catch history.

More Certainty Necessary

THE Icelandic ITQ system is by no means perfect from an economic point of view. Some of its defects are institutional, such as a partial exemption of small boats from the system and some (minor) restrictions on transfers. To be more efficient, it should be comprehensive, with no restrictions on transfers. Moreover, ITQs should not be attached to vessels, as they are at present, but rather freely transferable to and from all Icelandic citizens. An important improvement would also be to make the vessel owners responsible for decisions on TACs and the administration of the system. The worst defect of the system is however the uncertain legal status of the ITQs, stemming from the reluctance of government to recognise them as at least on a par with private property rights. While the Icelandic courts have not supported the opponents of the system in their attempts to challenge it, they have not, either, affirmed the rights of the quota holders. There is vocal opposition in Iceland to any recognition of ITQs as private property rights. To some extent it

reflects the old ideological division between those who support private property rights and free trade, and others who put their trust in government intervention and community values. In the Icelandic debate the voice of Rousseau speaks for maintaining, at almost any cost, harvesting by small boats; the voice of Marx speaks against enclosing fish stocks, and recognising exclusion rights of a few against the many; and the voice of Henry George speaks for introducing a tax expropriating the rent derivable from utilisation of the fish stocks.

It is important however not to focus too narrowly on ITQs. At best (with full legal recognition of their durability, and no restrictions on their transfers, and decision-making in the fisheries in the hands of their holders), they are rights of extraction from a resource rather than full private property rights to the resource (Hannesson, 1994). There are other ways of restricting access. In some fisheries the right held by the fisherman is a right to use a certain type of fishing gear over a certain period of time, e.g. a rod on an Icelandic salmon river, and a trap in the inshore lobster fishery of Western Australia. While such input or effort restrictions may eliminate some problems about free entry or open access, they are not likely to be commercially successful (which is not anyway their aim, at least in the salmon fishery in Iceland). In some countries, access is restricted neither in terms of catch nor effort, but rather by communities whose exclusive right to harvesting in a given fishery is recognised by custom or by law. Such restrictions constitute a kind of a property right by the community, but usually it is neither divisible nor transferable and therefore not very efficient. In some local fisheries, e.g. for inshore eel, lobster and shrimp and even in some well-identified demersal fishing grounds, territorial use rights in fisheries, TURFs,

might be more appropriate (although there is no reason why they should be incompatible with ITQs). In coral islands in the Caribbean and the Pacific Ocean where many species are harvested together, TURFs might also be more appropriate. Such TURFs might be allocated to communities or associations rather than individual fishing firms, but then problems of entry into, participation in and exit from such communities and associations might arise.

In general, the closer fishing rights come to be private property rights, with their durability, security, transferability and exclusivity, the better they will work. What is important is to try to enclose the fish stocks—to take them into custody and to identify as custodians individuals and associations who have a direct interest in their long-term profitability. Therefore it was a step forward when individual countries in the 1970s and 1980s enclosed their fishing grounds by extending their EEZs to 200 miles. For the same reason, it may have been a step backward when the EU more or less decided to treat the EEZs of individual member countries as a common pool. A firm distinction has to be made between open access to a *market* and open access to a *resource* (De Alessi, 1998). From an economic point of view, the former is certainly desirable, whereas the latter is not. A more promising path for the EU would have been to divide those individual EEZs further up between communities, regions, associations, firms and individuals.

Be that as it may, a system of ITQs is very attractive in theory. It seems to provide what economists sometimes regard as an impossibility, a “free lunch”: In an ITQ system the rent dissipated under free entry will be captured, at least partially, and can be used to entice stakeholders in fisheries, most importantly owners of fishing capital, to accept the necessary

restrictions on entry. It is this captured rent which constitutes the free lunch. But in practice, the introduction of such a system may be difficult, although by no means impossible. If government appropriates the rent, or tries to do so, it makes less likely the widespread acceptance in the fishing community of the new system, however attractive it is in theory. Here as elsewhere, if political reforms are to succeed, private interests have to coincide with the public interest.

The Politics of Property Rights

“THE ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood,” John Maynard Keynes once famously asserted, continuing: “Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist” (1936/1973, 383). While this assertion does, in general, seem somewhat of an exaggeration, it certainly fits the Icelandic debate on how to manage the fertile deep-sea fishery in Iceland’s Exclusive Economic Zone, EEZ. Many of the participants in the debate, perhaps unwittingly, were echoing ideas from the 19th and early 20th century. The first Icelandic economist to write a scholarly paper on the issue, Bjarni Bragi Jonsson of Iceland’s Central Bank (1975), for example, analysed the fishery in terms of Pigovian inefficiencies which had to be corrected by a government tax. The problem was, according to him, that there was free access to the fishing grounds so that the owners of fishing firms did not, in their calculations, take into account the real cost of utilising the resource. Hence, there was over-investment in the fishery, resulting in the dissipation of the rent which could otherwise be derived from the varying fertility of different fishing grounds. Government had to force the owners of fishing capital to take the real cost into account by imposing a “resource rent” tax on them. Jonsson explicitly recognised the similarity of his proposal to that of the 19th Century author

Henry George of a land tax, designed to capture the rent derivable from land. In the ensuing debate, some economists, e.g. Thorvaldur Gylfason (1990) and Markus Moller (1996), did not, in effect, move beyond this simple Georgian solution to a Pigovian problem, while some of them indeed proposed a periodic government auction of fishing permits rather than a tax. Needless to say, their ideas were taken up by some politicians: It would not have surprised Keynes that a political party was established in 1999 with the chief aim of imposing some kind of a special charge on the owners of fishing capital.

The Pigovian Tradition

WHAT is it that those economists failed to see? And why? First, let me briefly explain what I mean by Pigovian inefficiencies. In *Economics and Welfare*, Pigou gives the example of two roads of different quality going between two cities (1920). One road is good, but narrow, while the other one is full of holes and difficult to drive on, but quite broad. Pigou then argues that the allocation of commercial traffic between the two roads will be inefficient because there will be more than optimal traffic on the better road, and less than optimal traffic on the worse road. The reason is that the drivers when choosing between the two roads do not take into account the real costs of driving (i.e. the superiority of the better road). The “rent” from the superiority of the better road will be dissipated in the congestion on that road. The solution, according to Pigou, was for government to price the two roads according to their different quality, in other words to build toll booths on both roads and charge a higher price for the use of the better road, reflecting its superiority. At first sight, the tale of the two roads is a clever one: Pigou apparently made visible the previously invisible cost of not

pricing resources according to their different quality; he also proposed a seemingly feasible solution of the problem. Indeed, the initial analysis of overfishing in the Icelandic waters was quite similar. We were asked to compare the fishery with another sector of the economy, say, agriculture. It was then argued that farmers had to pay a full price for the use of their natural resources, such as land and livestock, whereas owners of boats had free access to the fish stocks in the Icelandic waters, the EEZ. Hence, there was over-investment in the fishery compared to agriculture, and this had to be corrected by a Pigovian tax or charge on boat owners, reflecting the value of the fish stocks. Moreover, it was asserted that the government income derived from such a tax, or charge, would not be an additional burden on the fishery because this would only be what had previously dissipated in economic overfishing, in too many boats, with too costly equipment, harvesting scarce fish.

Frank H. Knight was quick to point out a flaw in the tale of the two roads: Pigou had not thought of the possibility that the two roads were privately owned (Knight, 1924; Buchanan 1956). If this was the case, then the owners would charge prices for their use according to their different quality and the allocation of commercial traffic between them would be efficient. This suggests a major objection to the whole Pigovian research programme. It is that Pigou and his followers are looking for inefficiencies in the economy consisting in some resources not being priced correctly, and proposing various government taxes, charges, fees or tolls to “correct” those situations. Instead, they should be looking for rules under which individuals can themselves negotiate themselves out of such situations. After all, it is the whole point of market transactions to correct inferior situations. If I have a piece of fish and I need a coconut, whereas

you have a coconut and you need a piece of fish, then we trade to our mutual benefit. This, again, suggests a different research programme. If the problem is that owners of fishing capital, i.e. the boat owners, do not take into account the real cost of utilising fish stocks in the Icelandic waters, unlike farmers who are faced with prices of land and livestock, then we should seek a solution whereby the boat owners could establish some kinds of private property rights to either fishing grounds or fish stocks, and not try to impose a government tax or charge on them. But many of the Icelandic economists who participated in the initial debate on overfishing were so steeped in the Pigovian tradition that they did not consider this at all. I still remember the derision with which I was met when I innocently suggested at a conference on Iceland's future, held at Thingvellir in 1980, that we should investigate the feasibility of defining property rights to individual fishing grounds or fish stocks. Mockingly, the editor of the (now defunct) Icelandic socialist daily wrote that some years ago a poet had not been too much off the mark in composing a poem about "holding stocks in the sunset", since I was now proposing turning the fishery into private property (Bergmann, 1980).

The Coasean Research Programme

SEARCHING for property rights which would enable individuals in transactions to eliminate or minimise harmful effects of economic activities, instead of proposing government taxes on such activities, is in essence what I would call the Coasean research programme, after the Chicago economist Ronald H. Coase. The contrast between this and the Pigovian programme is clearly brought out by the tale of the two roads, but also by another example, which is interesting for our purposes,

that of radio frequencies. In the early 1920s, radio stations were established all over the U.S., offering various kinds of entertainment and information, and selling access to their audiences to advertisers. Harmful effects of those activities emerged when two radio stations in the same neighbourhood began broadcasting on frequencies too close to each other. This was a classic case of free access to a scarce resource, resulting in an inefficiency. As Coase pointed out (1959), this problem could be solved by introducing private property rights to radio frequencies in different locations. (It is not a part of our story that U.S. courts were in the 1920s beginning to recognise such rights on the basis of first possession, when the U.S. Congress stopped this process by declaring the radio spectrum public property and started allocating radio licences, i. e. broadcasting rights to radio frequencies in different locations; Hazlett, 1990.) What is relevant here is that the harmful effects which congestion in the radio spectrum created, were quite visible (or rather audible), whereas the harmful effects which congestion on the better road in Pigou's tale caused, or, similarly, the congestion on the fishing grounds in Icelandic waters, were invisible effects and had to be brought out by an economic analysis. These were effects which the participants in the economic activities in question mutually, but unintentionally, inflicted on one another. They, and only they, were the directly injured parties (while the rest of society of course lost indirectly by the dissipation of rent). In Iceland, for example, the fish processing firms ashore did not suffer, nor did the seamen: they operated in markets where scarce resources were priced in market transactions. It was only the owners of fishing capital who suffered directly by participating in economic activities

which resulted in overfishing, or in other words by themselves inflicting harmful effects on one another.

Let me clarify this point by a brief discussion of the often proposed pollution tax. A factory operates by a freshwater lake, say, discharging waste into the lake because it does not have to take into account the cost of doing this. A pollution tax on the factory is supposed to “correct” this. But who benefits? Why is there not instead a provision for a direct money transfer from the factory to the victims of pollution? It is they who suffer the pollution, and not the government. And if the victims cannot be readily identified, is this then a case of pollution in any meaningful sense? (Coase, 1988, 180–1). The solution, in terms of the Coasean research programme, would be, of course, to try to define property rights to the freshwater lake and let its owners and the owners of the factory sort out themselves any problems which would be caused by the harmful effects of economic activities. The important question is whose harm we are talking about. The same applies to road congestion. If a road toll is just imposed by government, the drivers are not better off. Instead of indirectly bearing the cost of using the better road in the form of longer driving time, i.e. congestion, they have to pay a road toll. (It would be different if the toll were earmarked and went to the maintenance and improvement of the road system.) Consider again the owners of fishing capital. Because there is free access to the fishing grounds, they dissipate all the possible rent from the resource in excessive harvesting costs. They do this unintentionally and perhaps also unwittingly, compelled by the logic of the situation. The economists who propose a government tax or charge, are not solving their problem: those economists are merely creating a new and efficient source of tax

revenue, namely appropriating for government the rent which previously was dissipated in excessive harvesting cost.

Economists who talk in this connection about “internalising externalities” may make it difficult to see the wood for the trees. We are talking about living people, engaging in economic activities, not numbers in an equation. Coase’s expression, “harmful effects,” comes closer to the mark. But what is important is that all this is really about the classic problem of freedom and its constraints. My freedom to swing my fist ends at my neighbour’s nose. My right to use my possessions is constrained by the same kinds of rights that other people hold. The most widely accepted idea of government in the West is that it exists to enforce the golden rule of the full and equal rights of all to freedom (Popper, 1974, 350–1). Government tries to prevent one person from using his freedom to harm another one. If we extend this idea to the cases discussed here, such as pollution of lakes or congestion on the roads, in the radio spectrum or in the Icelandic fishing grounds, where people harm one another because there is no proper framework of rules, then the task of government is to provide such a framework. In most cases that framework could be a system of private property rights. Sometimes such rights are only use rights, for example radio licences or ITQs, but sometimes they could be full property rights, as to the freshwater lake in our example. Modern technology is in many ways facilitating the introduction of such rights. Consider technology which can read the number plates on cars passing on a road, and subsequently charge their owners’ credit cards for the use of the road, making feasible the private ownership of roads without long waiting lines at toll booths. But in all cases such property rights in a wide sense are introduced to enable people

to resolve difficulties which arise because of the harmful effects of individual activities (Demsetz, 1967). Good fences make good neighbours. They also make excellent economic sense.

Pareto-Optimality

ONCE the objective is seen as that of enabling people to resolve difficulties which arise because of the harmful effects of individual activities, we realize how strange and almost perverse it is to try to solve it by government taxes, charges, fees or tolls. By such measures, one cost for the individuals is simply replaced by another one. Instead of dissipating rent, the individuals pay the equivalent amount to government. They are not better off personally (except indirectly, through government, and even that is arguable). In the case of the fishery, some of them will even be worse off. This can easily be demonstrated. The classic analysis of economic overfishing is that there are sixteen boats harvesting a fish stock where eight boats would be optimal. The reason why the number of boats increases from eight where the fishery would be most profitable (the difference greatest between revenue and cost) to sixteen where there is no revenue except the average income in the economy (total revenue equal to total cost) is that there is free entry. Boats will be added until there is no more extra revenue. In other words, the rent which could be derived from the resource is all dissipated (Gordon, 1954; Scott, 1955). All economists (indeed all reasonable people) would presumably agree that the task at hand is to reduce the number of boats from sixteen to eight and thus to minimise cost. To achieve this, as already mentioned, some Icelandic economists suggested that government either imposed a resource rent tax or that it auctioned off fishing permits, setting and adjusting their price

in such a way that the number of boats would be reduced to the eight more profitable ones, since the eight less profitable ones would not be able to pay the tax or the auction price. Others, including Ragnar Arnason and myself, wanted to give transferable, permanent fishing rights, namely the ITQs, free of charge to the owners of the sixteen boats, thus enabling them to negotiate themselves out of the undesirable situation (Arnason, 1990; Gissurarson, 1983). Over time, the eight more efficient boat owners would have bought out the eight less efficient.

Economic theory allows us to predict that both proposals, imposing a Pigovian government charge or giving Coasean fishing rights to the boat owners on the basis of catch history (i.e. the principle of first possession), would have had the same final outcome, namely the reduction of the boats from sixteen to eight. But this does not mean that the two proposals were both equally efficient. First, the Pigovian proposal would not have been Pareto-optimal. Briefly, a social change is Pareto-optimal if all or at least some become better off without anyone becoming worse off (Buchanan, 1959). The Pigovian proposal whereby eight boats would be priced out of the fishery by government would mean that, 1) government became much better off, since it would receive the tax or auction revenue; 2) the eight more efficient boat owners would be equally well (or badly) off as before, since they would simply pay to government what they previously had to bear as excessive harvesting costs; 3) the eight less efficient boat owners would become worse off, since they would be deprived of their previous means of existence. The Coasean solution, however, was Pareto-optimal since: 1) government would become slightly better off because of increased efficiency in the fishery; 2) the owners of the eight remaining boats would become better off; 3) the owners of the

eight boats leaving the fishery would not be worse off, since they sold their fishing rights at prices freely negotiated. In essence, the difference between the Pigovian and the Coasean proposals was that of forcing eight out of sixteen out of business by their inability to pay the set price, and of buying them slowly out.

This suggests a second argument for the economic inferiority of the Pigovian proposal. It is that transaction costs under it were much higher. Suddenly, by the stroke of a pen, half the fishing community would have been deprived of their means of existence instead of being able slowly to adjust to the fact that the number of boats had to be reduced. A third economic argument which applies to the situation after the desired reduction of the fleet is that the fishing community would not have the same incentive to protect the fish stocks if it had to buy fishing permits annually from government instead of the boat owners holding permanent fishing rights and thereby regarding themselves as guardians of the resource (Johnson, 1995). A fourth argument, also applying to the situation after the desired reduction of the fleet, is that the individual boat owners would be more likely to use the rent derivable from the fishery sensibly than government, at least as we know government: if the revenue from selling the fishing permits had gone to government, rent dissipation ashore (the wasteful competition for government handouts) would have replaced rent dissipation offshore (Runolfsson, 1999).

Locke versus George

THE strongest arguments against the Pigovian proposal are political and philosophical. In the Icelandic fishery, the proposal was politically unfeasible because the fishing community would

never have accepted a change which implied that half of the fleet, with its crew, would have ceased to operate by a stroke of the pen, in just one day (or even if it had been a much longer period, years, say, or decades). The stark unreality of the proposal indeed illustrates what Coase means by “blackboard economics” (1994, 5). In the second place, the Pigovian proposal was unjust because it would have meant that half the fishing community would have been suddenly hindered in earning its livelihood in its traditional manner. For many, it would have rendered the investments of a lifetime, not only in boats and fishing gear, but also in knowledge and skill, worthless in just one day, and needlessly so: the owners of fishing capital were harming one another, not the rest of society. The Pareto-optimality mentioned above is yet another expression of the golden rule that one man’s freedom must not imply or entail another man’s unfreedom, or that my fist is not allowed to reach your nose: the requirement is that nobody becomes worse off by a social change. Another way of expressing this golden rule is that of the Lockean proviso (as interpreted by Robert Nozick). John Locke argued that God had given the earth with all its resources to mankind in common, but that individuals might appropriate resources provided that others were not made worse off by this (Locke, 1689/1967; Nozick, 1974, 178–82). It is clear that the introduction of Coasean fishing rights, as here described, meets the Lockean proviso; and it is equally clear that the Pigovian tax does not.

Indeed, when the economic and political difficulties with the Pigovian approach were pointed out in the Icelandic debate, its proponents responded by saying that this was not only a matter of efficiency, but also of justice. They said that it was simply unjust that the initial recipients of fishing rights

should profit from their exclusive access to a resource which should be the common property of the Icelandic nation. Why should government hand such a bountiful gift over to a small group of people who found themselves in the fishery, almost coincidentally, when the ITQ system was introduced, they asked rhetorically (Gylfason, 1993). The Icelandic press regularly published news about people who sold their ITQs for enormous sums of money, thus stirring up further resentment. The press rarely paused to consider the fact that this was precisely what the process was about: inducing people to leave the fishery voluntarily. The Icelandic critics of the initial allocation of fishing rights were of course right that the rent previously dissipated in excessive harvesting costs now went (not all at once, but gradually increasing) to the boat owners, whether they chose to hold on to their exclusive fishing rights or to sell them. But it does not take long to see that the underlying argument against the initial allocation is that of Henry George (1880/1951): the holders of the exclusive rights to utilise the natural resource had not created it and did not deserve the rent derived from it. The Icelandic critics simply substituted fish stocks (or fishing grounds) for land.

One well-known flaw in the Georgian project does not seem to apply to the fishery. This is that it is difficult or almost impossible to make a distinction between that part of the income of a landowner which is derived from rent and that part of it which is the result of his efforts to improve on his property, e.g. by cultivation. The fish stocks, unlike land, are given, it is claimed; they are not improved on by man; hence, the rent from them can be isolated; it is simply the government revenue from the resource rent tax or from auctioning off fishing permits. The discussion above would suggest that the

matter is not as simple as that. The total revenue which can be derived from the fishery if it is in the hands of people who have a long-term interest in its maintenance may be larger than if it is owned by government. Moreover, there is more incentive for exploring possible ways of improving on the resource, e.g. by cultivation or fertilisation, or new ways of fencing or branding, if it is privately owned. But even if this claim is accepted, there are other arguments against Georgism in the fishery. One is that once transactions of fishing rights have widely taken place, it seems unjust for government to appropriate those rights. If more than 90% of the ITQs are no longer in the hands of their original recipients, for example, this means that almost all their present holders have paid a price for them. It may not be the full price, since it takes time for the fishery to capture the full rent previously dissipated, but it is a price nevertheless.

The main philosophical argument against Georgism in the fishery is the same as elsewhere. It is that the distribution of our assets or holdings is not, will never be, and indeed ought not to be, according to moral merit or desert. This is because such a distribution is, in a free society, the outcome of past individual choices which do not necessarily reflect our ideas of moral merit (Nozick, 1974, 160–4). A mother who gives care and comfort to her child is not doing it on the basis of merit; she does it because it is her child. Those who flock to listen to a famous opera singer, born with a powerful and vibrant voice, do not do it because he deserves it; they buy tickets to his concert because they prefer him to other singers with weaker voices. Rent is derived not only by landowners or holders of ITQs, but also by beauty queens, skilled sportsmen and individuals of superior intellect, all of whom have inherited most such assets and only partly earned them. Why should rent

only be expropriated in the fishery? Of course, desert is a moral consideration. But it is only one of many. A just distribution of assets or holdings is, according to a traditional view, one which has come about by individual choice, and without harming anyone. Justice had traditionally been considered a negative virtue, or the absence of unjust acts. As Adam Smith says: “Mere justice is, upon most occasions, but a negative virtue, and only hinders us from hurting our neighbour” (Smith, 1759/1979). If justice means the absence of injustice, then the change from an open access fishery to a fishery with exclusive use rights initially allocated to the owners of fishing capital on the basis of their catch history, was just, and initial allocation on any other principle would have been unjust. This can be couched in economic terms. The costs of leaving a fishery are much greater than the costs of not entering it. Therefore, when the fishery had to be enclosed, it was economically efficient to allocate the exclusive fishing rights to those within the fishery—to those who had invested in it, i.e. the owners of fishing capital—and not to those outside it (Demsetz, 1988).

The Spectre of Georgism

THE description offered here of the development of the Icelandic ITQ system is quite idealized and simplified. The real system was formed not by conscious design, but more or less in a process of trial and error where the boat owners and other interested parties stumbled on measures, found them efficient, and received government support for continuing on the same path. The objective of most of the policy measures were not to minimise harvesting cost, but rather to avert the depletion of the fish stocks. The Icelandic ITQ system was not made; it happened. Nevertheless, the main issues for our purposes

are clear. Over-utilised resources had to be enclosed; exclusive, private rights had to be formed to them. Who were to receive those rights, and why and how? Thus arose the philosophical problems which have preoccupied thinkers like John Locke, the great defender of private property, and his antagonists, such as Karl Marx and Henry George. But the reason why the Icelandic debate may be relevant to the further development of property rights in the fisheries of other countries, and also in fisheries outside the EEZs of individual states, is that the Georgist and Pigovian ideas are still quite strong, even amongst economists. Many fail to see the problem of overfishing as yet another example of the harmful effects of economic activities which should be eliminated or at least minimised by private transactions. They do not seem to realize that an inefficient situation of this kind should not be treated as yet another opportunity to impose taxes or other burdens on the citizenship, but rather as a challenge for government to fulfill its legitimate purpose of creating a framework under which free individuals can make choices and mutually adjust their activities. Indeed, perhaps one source of the blindness to the real nature of the problem is the idea that economics is about the maximisation of production rather than the coordination of individuals (Hayek, 1945).

As Keynes pointed out, ideas are powerful. In December 1998, after an important decision by Iceland's Supreme Court which some people interpreted (wrongly as it turned out) as going against the ITQ system, 105 professors at the University of Iceland (of a total of around 150) signed a declaration asking, in effect, the government to impose a charge on the quota holders, designed to capture the rent which they were supposed to derive from the fish stocks. This is remarkable.

Two thirds of the university professors supported Georgism in the fishery. At the time those people did not prevail. But it was a close call. Moreover, in 2002, in order to mitigate the opposition to the ITQ system, government imposed a nominal charge on the quota holders. There has also been some talk about introducing a provision into the Icelandic constitution about the fish stocks as common property. An influential daily newspaper, *Morgunbladid*, traditionally politically conservative, relentlessly fights against the ITQs being developed further in the direction of private property rights, which could be done for example by removing all restrictions on their transferability and also by recognising them as permanent and inalienable (except of course by consent). Meanwhile, despite all the sound and fury, the Icelandic ITQ system has been working reasonably well. While the quotas are now held by much fewer fishing firms than before (as was to be expected), most of those firms have become joint stock companies, so that the indirect ownership of quotas is quite widespread. Moreover, most of the fishing firms are located outside the Reykjavik area so that their quota holdings have served to maintain a robust economic life in Iceland's less densely populated regions. Again, as theory would predict, the owners of fishing capital are behaving quite responsibly, advocating a cautious setting of the annual allowable catch in the various fish stocks in the Icelandic waters: as Ragnar Arnason has cogently argued, the Icelandic fishery seems ready for self-management.

Finally, we may speculate why Iceland is one of the very few countries in the world to have introduced a comprehensive system of ITQs in her fishery. If ITQs are as efficient as economists argue, and as the Icelandic example indeed seems to show, why have they been adopted in so few fisheries and

in so few countries? Three reasons for the early introduction of ITQs in Iceland are undoubtedly that the Icelandic fishing community is relatively homogeneous, that the collapse of the herring stock in the mid-1960s was fresh in the memory of policy makers and that the fishery is a very important sector of the Icelandic economy. Therefore, when the fishing community gradually (and reluctantly) reached an agreement about ITQs, it did not take long for parliament to write that into law. On the other hand, the resentment because of the rent captured by owners of fishing capital was probably much more common and intensive in Iceland than it would be elsewhere, because of the relative importance and visibility of the fishery. The fact mentioned above that most of the quotas were and still are held by fishing firms outside the Reykjavik area may also have increased political support for the ITQ system. Moreover, in Iceland there has long been negligible unemployment which means that there was little resistance from those employed in the fishery to the foreseeable reduction in fishing effort brought about by the system; they knew that they could easily move to other sectors of the economy. In other countries, for reasons suggested above, I surmise that it will be more difficult to introduce such a system, but that it will be easier to maintain it, as the fishery is nowhere such an important sector of the economy that the rent derived as a result of the change, will become very visible and cause resentment. Perhaps the Icelandic debate generated more heat than light. Nevertheless, it showed quite clearly that the spectre of Georgism is still haunting the world.

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The Icelandic Fisheries

Sustainable and Profitable

Non-exclusive resources tend to be over-utilised. In this collection of papers, Professor Hannes H. Gissurarson of the University of Iceland discusses some examples: offshore fisheries, fisheries on the coast, public roads, early U.S. broadcasting, mountain pastures, and salmon rivers. His focus is on the Icelandic offshore fisheries where in the early 1980s a system of individual transferable quotas—ITQs—was adopted with considerable success. Whereas elsewhere many fisheries are operated at a loss and some fish stocks are even endangered, the Icelandic fisheries are both sustainable and profitable. A similar system is in place in New Zealand and in several local fisheries around the world. Professor Gissurarson argues that the main problem about offshore fisheries as well as other non-exclusive resources is political, or even philosophical: It is how to make the necessary move from open access to exclusive rights of utilisation. This can only be done, he believes, by taking into account the legitimate interests of existing fishing firms in continuing to operate their vessels.

