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The economics of the Swedish individual transferable quota system: Experiences and policy implications

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ABSTRACT

Sweden and other European Union countries are currently carrying out extensive work aimed at improving the marine and freshwater environment. The adaptive management approaches typically used for this require the development of new policy instruments and measures when needed, but also evaluations of instruments and measures already in use or under way. This paper reports on a study of the Swedish individual transferable quota system introduced in 2009 for the pelagic fishery. The new system was motivated mainly by economic arguments and, thus, the need to get incentives right. Despite this, the design of the Swedish system weakened the intended incentive effects in several ways, compared with the foreign systems that served as models. Moreover, the information needed for future evaluations was not collected, even though the need for future evaluations had been expressed explicitly and the data needs for this could be identified at the time that the system was introduced.

1. Introduction

Individual transferable quotas (ITQs) are frequently discussed as an effective policy instrument to increase the profitability of the fishing industry, reduce industry overcapacity, and promote sustainable fisheries management. The positive effects of ITQs on performance, profitability, and fish stocks are expected to materialise when ships with different marginal costs of operation can start trading quotas.

In Sweden, an ITQ[1] system for pelagic fishing (fishing for herring, sprat, mackerel, horse mackerel, blue whiting and sand eels) was proposed in 2005 by the Swedish Board of Fisheries[2]. The background was the huge overcapacity and poor profitability of the Swedish pelagic fishing industry. Two years later, the government tasked the Board of Fisheries with developing and completing the proposal. During 2008, the Ministry of Agriculture presented a memorandum [25] which led to a bill on transferable fishing rights [21]. On August 1, 2009, the new Act on transferable fishing rights (Act 2009:866) went into force. Five years later, in October 2014, additional legislation empowered the government to expand the regulations to cover other species. Later that year, the impact of the Swedish system on capacity reduction, profitability, small-scale coastal fisheries and the development of various regions was evaluated by the lead government agency [34]. The conclusions were that the system had been effective, i.e. that fishing capacity had been reduced and profitability increased. The government is currently examining the question of a possible expansion of the system, but requires that it be preceded by a thorough investigation of the consequences for both the fishing industry and the environment.

That there is a political desire to evaluate policy instruments' consequences before they are introduced is clear from numerous policy guidelines. Furthermore, in marine environmental policy work, there are European Union (EU) requirements for various economic assessments, including cost-effectiveness analyses. The EU's Marine Strategy Framework Directive (MSFD)[3] and Water Framework Directive[4] set up a number of requirements for

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[1] Different terminologies abound for this and related concepts in the literature. Swedish literature on the topic uses concepts that can be translated as “transferable fishing use rights”, “transferable fishing rights” and “transferable quotas”, for example, while English uses the terms *transferable fishing concessions* and *individual transferable quotas*. The preferred term in this report is that of *individual transferable quotas*, but the other terms are treated as synonyms. However, the Swedish legal term for the policy instrument used in the pelagic fishery, namely *överlåtbara fiskerättigheter*, translates as “transferable fishing rights”, and should not be confused with the legal term *fiskerättigheter* [“fishing rights”] in isolation, which refers to fishing rights linked to ownership of land adjacent to fresh water.

[2] The Board acted as the lead agency for fisheries management at the time, but was subsequently abolished. The current lead agency is the Swedish Agency for Marine and Water Management.

[3] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy; EUT L 164, 25.6.2008, 19–40.

[4] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy; EGT L 327, 22.12.2000, 1–73.

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different forms of socio-economic analysis. The MSFD demands that measures be assessed on the basis not only of technical feasibility, but also of economic cost-effectiveness. The MSFD also requires that the impact assessments of new actions that a country develops to achieve environmental quality standards should include economic cost–benefit assessments[5]. Thus, there is a clear political wish that policies aimed at protecting the marine environment should be as economically efficient as possible, and that the measures and instruments used should be evaluated both ex ante and ex post.

The aim of the Swedish ITQ system in the pelagic fishery was to change private actors' behaviour by altering the incentive structure they encountered; but there were also explicit statements that the instrument would subsequently be evaluated. In this paper, therefore, the Swedish ITQ system is offered as a useful case study to discuss the implementation of socio-economic analyses of policy instruments used in marine environmental policy.

2. What was known about ITQs in 2009?

The destructive economic incentives associated with open access fisheries, total-allowable-catch (TAC) systems and non-transferable fishing quotas are well-known to fisheries researchers (e.g. [6,10,11,20,24,26,32,36]) and, increasingly, to policymakers and fisheries managers. Overfishing, fishing during unsuitable parts of the fishing season, lobbying for expanded fishing quotas, discarding bycatches, and overall excess fishing capacity are some key problems that have been identified and are directly linked to the incentive structure facing fishermen[6] in such industries.

Therefore, a growing number of countries have experimented with economic instruments aimed at giving individual fishermen incentives to act in ways that are economically efficient as well as biologically sustainable. Numerous countries have introduced ITQ systems where the individual fisherman receives a fixed share of future catches from one or several fish stocks, and this fixed share can be sold, rented, or given to other fishermen.

In the short term then, the fisherman has an incentive to fish his/her share of the total catch in a manner that provides the highest possible profitability. In the longer term, such a system provides an incentive to sell the share to more efficient fishermen who are prepared to pay more for the share, and gives the individual fisherman greater reason to care about the fish stock's future state, as a larger future stock means greater future yields for such individuals.

As long as the fisheries management authority continues to set the total annual quota, the managing authority will determine how quickly the fish population can recover. Nonetheless, ITQs lead to greater industry support for more restrained fishing, which can be expected to enhance future profitability (see e.g. [22,31,33]).

Iceland and New Zealand were early adopters, introducing ITQs in the 1970s and 1980s for selected species and then gradually extending them to additional species (for Iceland, see e.g. [3,17,29]; for New Zealand, see e.g. [5,12]). The profitability of the affected fisheries rose dramatically and excess capacity declined. Since then, similar systems have been introduced or considered for numerous fisheries around the world (see e.g. [2,30,35]). Surveys (see e.g. [9,15,23]) indicate socio-economically beneficial effects in most fisheries in which ITQ systems are in place.

The relatively long experience of ITQ systems means that there has been considerable theoretical and empirical research on their impacts. There are obvious benefits to taking advantage of this research for countries wishing to implement such systems, and Sweden had this opportunity as well. Here, some important lessons that were available from research when the Swedish system was introduced in 2009 will be discussed.

The prices of ITQs (and, when quotas can be rented out temporarily, the rental prices) serve as an extremely important signal for the individual fisherman as well as for the fisheries manager (see e.g. [13]). High prices give fishermen with poor profitability the incentive to sell their quotas to fishermen who are prepared to pay those high prices. Since one of the goals of this type of system is often to speed up structural change and reduce overcapacity, fisheries managers have an interest in high prices. Valuable quotas can, in turn, be used as security by fishermen wishing to take out bank loans, which can contribute to further rationalisation in the industry.

However, if the fishery is small, trade in quotas will be limited, simply because there are not many actors who can trade. When major players trade, the prices of the quotas may fluctuate dramatically, creating uncertainty among other potential market participants about the price they could expect if they wanted to trade. A market with clear and transparent price formation and many potential players is, therefore, of interest to the individual fisherman and the fisheries manager alike (see e.g. [27], who studied price formation in the New Zealand ITQ system).

The price of quotas also shows what the fishermen themselves think about the future profitability of the fishing industry – and, thus, the future of fisheries management. In most publicly administered ITQ systems, the total fishing per season is still determined by a public fisheries authority, which thus remains responsible for the fish stock's future recovery. Low quota prices indicate that fishermen expect poor profitability in the future; this, in turn, is a sign that they do not expect fish stocks to increase, i.e. they believe that current overall quotas are too large, and/or that fisheries monitoring is of such a poor standard that not all catches are recorded. If the prices of quotas are high, on the other hand, this indicates that fishermen expect high profitability in the future and, hence, that fisheries management will lead to viable future fish stocks. Therefore, fisheries managers have a strong interest in monitoring the formation of prices, as the price indicates the level of confidence fishermen have in fisheries management [4].

However, the distributional impacts of quota allocation can potentially be problematic. For example, in Iceland, the value of ITQs rose sharply as stocks recovered and profitability improved [18]. Fishermen who had been listed on paper as nominal fishing rights holders received large windfall profits, while their colleagues, who worked on the same boats but had no fishing rights on paper, did not share in the quotas' rising values. Even when such situations do not arise, the allocation of fishing quotas means giving large (potential) profits to those actors who receive them, which may be politically complicated in societies where fishing plays a major role in the economy.

One way to avoid this problem is to establish ITQs that are limited to a certain time period, and then changed once their effects have been evaluated. However, the obvious disadvantage of such a system is that it limits the individual fisherman's interest in improved future profitability: fishermen who know that quotas will be redistributed in a few years will want increased withdrawals before then, while they still know what percentage of the catch they will get; they will also have far less interest in potential stock improvements after the end of the current rights' lifespan. Since such an arrangement also reduces the overall value of the quotas, it weakens the incentive for less-profitable fishermen to sell their quotas and leave the industry, while giving them a stronger incentive to stay in the hope of also receiving a share of quotas after the next redistribution.

An additional issue discussed in connection with ITQ systems is

[5] Article 13, MSFD.

[6] *Fisherman/-men* includes women fishers.

what happens when a single actor, or a few colluding actors, are able to dominate the quota market. Intuitively, one would probably expect that a dominant player should be able to drive up his/her profits to the detriment of the domestic economy in general, as monopolists in other markets can. However, it is normally the fisheries management authority that decides how large the total fishing catch should be. This authority also determines how much fish will be sold and, indirectly, how high the price of fish (which is of interest to consumers) will be. A fisherman can achieve a dominant position in the market if there are economies of scale in the industry, meaning that it is more efficient to have a fishery with one or a few players rather than many; however, as long as the total catch is determined by the fishing authority, this simply entails that the economic cost per fish caught will be lower than would be the case if there were many smaller fishermen. In sum, a dominant actor who owns a large percentage of the quotas can certainly affect the quota price, but the fisheries manager still determines the price of fish.

From the above it can be seen that important past experience, both theoretical and practical, could have been relied on in designing the Swedish system. Indeed, this experience was also discussed by Swedish researchers at the time (see e.g. [7,8,36]).

3. The Swedish ITQ system

In the latest EU Common Fisheries Policy reform, a legally binding requirement for Member States with fisheries in EU waters to introduce "transferable fishing concessions" was proposed but not accepted, but Member States may introduce such systems voluntarily[7]. The Common Fisheries Policy also states that Member States shall adjust their fleets' fishing capacity over time, in order to achieve a balance between fishing opportunities and fishing capacity.[8]

In Sweden, the Act on transferable fishing rights aims to "[e]nsure that the structure of the Swedish fishing fleet contributes to preserving fish stocks and to a fishery which is economically, environmentally and socially sustainable"[9]. A number of commenters stated when the bill was being draughted that it was unclear how the transferability of fishing rights would in itself lead to reduced fishing pressure or how a reduced number of vessels would automatically lead to a sustainable fishery; however, the government responded that the connection between a reduced fishing capacity and a reduced pressure on fish stocks was self-evident.

As from October 1, 2014, the government has been empowered to decide whether or not to include other species in the system of transferable fishing rights. The latest government commission on fishery legislation stated that the issue of introducing transferability in fisheries other than the pelagic was premature, and that further investigation was needed before doing so. The authorisation to expand the ITQ system has, therefore, not yet been utilised, but discussions on possible extensions are currently ongoing.

The Agency for Marine and Water Management handles matters relating to fishing licences and permits. A fishing licence is required, regardless of vessel size, in order to fish professionally on public waters in the sea[10]. In some cases, a special permit is also required; this is the case with most of the pelagic fishery[11]. Pelagic fishing that requires special permits is legally obliged to be combined with a right to transfer the fishing privileges granted by that permit. However, as discussed below, several fisheries for pelagic species in Swedish waters lie outside the system of transferable fishing rights.

Part of the national fishing quota for pelagic species is made available for commercial fishing through individual transferable rights (or quotas). These individual quotas are determined as a proportion of the overall pelagic catch (with the proportion fixed for the duration of the fishing right) and, ahead of each fishing year, specified in (metric) tonnes for that year once the overall catch has been determined. The proportion of the overall catch is based on the fishing licence holder's fishing during a reference period prior to the introduction of the system. Although the aim is to create well-defined use rights that can function as ITQs, as discussed below a number of limitations to these use rights have been put in place compared to the standard ITQ setup.

The transferable fishing rights introduced in Sweden in 2009 are valid for ten years from the date on which they were first established[12]. Thus, a fishing right that has been transferred continues to be in effect for the remaining duration of the original period of validity. The justification for the ten-year restriction on these rights was that it was "natural that the fishing rights granted [could not] be guaranteed for an indefinite future" and that this restricted period of validity was a business risk with which those trading in fishing rights would have to live. That prices might decline towards the end of the rights' lifespan was not seen as a decisive argument against restricting the lifespans, "as long as the duration [of the lifespan was] long enough". A duration deemed "long enough" was, thus, judged to be ten years from the date when the quota was first determined, but the actual length of the lifespan was not discussed in any greater detail. It was further pointed out that the Act's validity was not time-limited, which means that the authority could replace fishing rights with new ones when their lifespan expired.

In order to promote coastal fishing and "ensure that fishing [could] continue without constraints" and that there were "opportunities for start-ups in this segment", specific coastal quotas were set aside for fishing in Skagerrak, Kattegat and the Baltic Sea with passive gear, for example, or with smaller trawling vessels. Unlike the individual quota, the coastal quota is jointly allocated to all fishermen within this fishing segment, including new entrants. In addition, because of regional policy considerations, specific measures have been taken to promote fishing companies in the Baltic Sea through extra allocations. When the ITQ system was introduced, it was determined that these coastal quotas and regional measures should be kept separate from the ITQ system, so that the Board of Fisheries would "continue to have good opportunities to meet the interests of regional and small-scale fisheries". However, neither the memorandum on transferable fishing rights nor the associated bill discussed potential conflicts between the objective of maintaining small-scale and regional fishing and the overarching goal of restructuring the industry and enhancing profitability. Moreover, prior to 2010, no decision had been taken as regards what percentage of the national quota the coastal quota would constitute.

To counteract excessive concentration of quota ownership, several provisions were put in place. For instance, a fishing licence holder is normally granted fishing rights for only two vessels at any one time, and no single actor is usually permitted to hold more than 10 percent of the proportion of the national quota made available through individual quotas. The reason given when the bill was being draughted was that an excessive concentration of

[7] Article 21, Regulation (EU) no. 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) no. 1954/2003 and (EC) no. 1223/2009 and repealing Council Regulations (EC) no. 2371/2002 and (EC) Bi 639/2004 and Council Decision 2004/585/EC.

[8] Article 22, Regulation (EU) no. 1380/2013.

[9] Section 1, Act (2009:866) on transferable fishing rights.

[10] Section 29a, paragraph 1, Fisheries Act (1993:787).

[11] Chapter 5, Section 1, HVMFS 2014:19.

[12] Section 6, paragraph 1, Act (2009:866) on transferable fishing rights.

quota ownership would defeat the objective of the legislation, but no further explanation was offered as to why or how this would happen.

All quota transfers are required be approved by the Agency for Marine and Water Management. Since the system of transferable fishing rights is a combination of voluntary and public law instruments, where fishing rights are granted by a public law permit but their transfer is voluntary, all Agency approvals are obliged to be tested against the intent of the legislation; the Agency's assessment should take into account not only “environmental and biological considerations, but also economic and social aspects”. However, although approval has to be applied for in writing on a special form at the Agency, applicants are not required to report the price of the traded quota. This effectively means that it is impossible to determine, expost, the price at which a particular quota was actually traded.

Another omission in the memorandum and the bill was that no specific rules were suggested in respect of using transferable fishing rights as collateral for loans, despite the Swedish Bank Association arguing for such rules. One of the justifications for not including such rules was that only a limited group could potentially own or buy such rights, reducing their value as collateral to banks that would not be able to own them even temporarily while searching for buyers.

The stated main economic purpose of the Swedish ITQ system was to encourage structural change and reduce the number of vessels in the pelagic fishery, while ensuring fish stocks were sustainably harvested. Since the Swedish system made it attractive for fishermen with low profitability to sell their fishing rights to those with better profitability, it was reasonable to expect the objective of structural rationalisation to be achieved. Since the total fishing quota is still set by fisheries management authorities, the total withdrawal of fish was not changed as a result of the new regime. This meant that, from the outset, one could have predicted that one of the stated objectives of the new order – to preserve fish stocks – would not be directly affected by the new arrangements. On the other hand, one could also reasonably expect that the economic impacts of the new regime would be limited to effects within the pelagic fishery itself and that these effects would be positive: resources would be utilised more efficiently, resulting in improved profitability among those fishermen who stayed in that fishery.

At the same time, the Swedish system entails several important deviations from the classic ITQ model, and all these deviations have reduced the socio-economic profitability of the system as well as the incentives for structural change.

- Limiting the duration of fishing rights to ten years made such rights less profitable than rights of unlimited validity would have been, and therefore depressed the quota price. That new rights will be distributed after ten years, presumably among those who then remain in the system, makes it somewhat more attractive for fishermen with low profitability to remain in the fishery in order to take part in the next distribution of rights, reducing the intended restructuring.
- The system being limited to the pelagic fishery means that fishermen who sell their rights can shift their vessels to other fisheries, and thus contribute either to worsened overcapacity in other Swedish fisheries or aggravated overfishing of foreign stocks – neither of which is an economically or biologically desirable outcome.
- Not originally setting the coastal quota as a fixed percentage of the overall quota meant that fishermen who were part of the ITQ system initially could not predict what percentage of the overall quota they would actually gain. This made the rights less attractive and, thus, lowered their price.
- The limit on how many quotas an individual operator can own reduces the quota price.
- Not being able to use ITQs as collateral further reduces the quota price: not only does this make the right less valuable to the owner, it also counteracts the legislation's stated goal of encouraging structural change, as it makes it more difficult for the more profitable rights holders to borrow money to buy additional quotas and invest in their fishing companies.

One could, thus, expect in advance of the law's implementation that these restrictions – all of which serve to reduce quota prices – would slow down the intended restructuring and reduce the profitability of the remaining fishing companies. In addition, the system of coastal quotas means that inshore fishing continues to operate in line with the system that prevailed in the past, with the unfortunate incentives that such systems generate. Notably, however, even though all these limitations in the Swedish system could be predicted to lead to less restructuring of the pelagic fisheries and thus impair the system's main purpose, there was no actual discussion in the preparatory work of how large the effects on structural change might become. The coastal quota's exemption from the ITQ system was justified explicitly by the desirability of accommodating regional interests and maintaining small-scale fishing, while the purpose of the rest of the system was to encourage structural change and transition to larger-scale fishing; there was no real discussion of why structural change was desirable for most of the pelagic fishery, but undesirable in selected parts of it.

4. Evaluation of ITQs: what was known about data needs in 2009?

Although it was predictable that the Swedish ITQ system would lead to economic improvements, it would have been reasonable to ensure that the actual extent of such improvements could be evaluated. Given that the Swedish system has entailed several deviations from the classic ITQ model, it would also have been reasonable to ensure that the economic impacts of these deviations could be evaluated. One of the main deviations from the standard model, the limited lifespan of fishing rights, was justified explicitly by the need to follow up on the system; so there was clearly a perception from the outset that the system should be evaluated. Furthermore, since ITQs were discussed widely within the EU when the Swedish scheme was introduced, it was natural to see the new system as a potential model for other Swedish fisheries. For this reason as well, there was a clear interest in being able to evaluate the system in the future.

An ITQ system can be evaluated economically in several ways. For example, [5,14,28] compare employment, the number of vessels and the overall profitability of various fisheries before and after the introduction of ITQ regimes, which might seem like a natural way to conduct such an evaluation. However, this assumes that all changes in fishing profitability are due to the new ITQ system, and that, in the absence of an ITQ scheme, fishing could have continued as before; but neither assumption necessarily holds. In order to evaluate the effect of ITQs, one is obliged, in principle, to compare what actually happened with what would have happened if ITQs had not been introduced. This can be done even with aggregated profitability data and with ship-level and fishing-day-level statistics (see e.g. [1]), but it requires a credible theoretical model for how profitability and other indicators would have developed without ITQs (i.e. in a counterfactual baseline scenario).

Most economic evaluations have instead used the fact that the quota price gives an extremely important signal of how active fishermen themselves assess the current and future profitability of the fishery. In other words, if quota prices increase after the

system's introduction, it signifies that profitability has improved and that active fishermen are optimistic about the future prospects of the fishery. It is also known that the quota price would have been zero if the system had not been in place, making the counterfactual scenario easy to construct. Thus, for example, [23,27,3] use quota prices as their primary measure of the development of the fishery. If both sales and rentals of quotas exist, one can – because the rent corresponds to the expected profits from a quota during the current season, while the sales price corresponds to the expected discounted future potential rental income – also compare rents and prices to estimate the fishermen's expectations about future profits.

With more detailed statistics on revenues and costs for individual vessels, one can analyse empirically how fishing developed before and after ITQs were introduced; one can also model theoretically how the activity would have developed without the ITQs (see e.g. [16,19]). However, the quota price remains a key variable.

In Sweden, fishing rights holders are obliged to report changes in ownership to the Agency for Marine and Water Management; actors who rent fishing rights temporarily are also required to report doing so. However, there is no corresponding obligation in either case to disclose prices or rents either to the Agency or to other fishermen. Given that the price is a central source of information both for the managing authority and for other fishermen, it is remarkable that this potential source was not utilised better. In 2009, one could already have predicted that the non-availability of such information – in addition to leading to a less efficient market for fishing rights – would sharply reduce the opportunities for future evaluations.

As outlined earlier, deviations from the classic ITQ model were justified by way of, among other things, regional development needs, but without any further discussion of what the economic impact of such deviations might predictably entail. Even with these limitations, it was reasonable to believe that fishermen would leave the industry and that excess capacity would thus decline; but the limitations that were in place also meant that this structural change was slower than it would otherwise have been, and that the profitability of the remaining fleet has, thus, in all likelihood, been lower than it would otherwise have been.

However, without price statistics for fishing rights, it is extremely difficult to assess the extent of the actual impact of these deviations from the standard model – or, for that matter, the extent of the actual impact of the system itself – with respect to profitability and capacity. Considering the stated goal that the system would be followed up in future, and given the obvious interest in using the pelagic fishery as a test case for similar arrangements for other fisheries, it would have been natural to collect not only price statistics for quotas, but also detailed financial statistics for the fishermen who participated in the scheme. If these two sets of statistics had been collected, it would later have been possible to evaluate the effects of the system in detail and make projections of how such a system could be expected to work for other fisheries. What actually happened was that the agencies managing the system collected no price statistics, and continued to collect only the relatively limited financial statistics already gathered from all Swedish fishermen.

It may be noted that, in early 2015, when the option to rent out fishing rights was introduced in the Swedish shrimp fishery, there was, again, no requirement that rental prices be reported. This was another lost opportunity to collect valuable price information: it would have been easy to collect as part of reporting that had to be done in any case, not having such information makes future evaluations unnecessarily difficult.

The Swedish ITQ system's impacts on capacity and profitability in the pelagic fishery were evaluated in 2014 [34]. The evaluation report concluded that the system had been effective in reducing capacity: the number of vessels and their combined engine power had both declined by larger proportions than they had in the Swedish fishing industry as a whole. The report also noted that the ITQ system had not had any negative impact on small-scale fisheries or the number of landing ports, and had not increased the high concentration of ships on the west coast. Of the licensees who had sold all of their pelagic fishing rights permanently, over half were still engaged as licensees in other fisheries (the report did not describe the extent to which the others were still active in fishing as employees of other licensees), and a few had acquired new vessels to fish Norway lobster on the west coast, for example, and pelagic species within the coastal quota. However, the report did not discuss the consequences of these fishermen having shifted their capacity to other fisheries in this way, and potentially contributing to overcapacity and overfishing there.

There was, moreover, no discussion of how the pelagic stocks had changed since the introduction of the system. Given that the total quota is still determined by the Agency for Marine and Water Management, which therefore also determines how stocks will develop, it may seem natural that the evaluation did not comment on the stock situation because it is not affected by the ITQs. However, considering that improving stocks was one of the objectives of the new system, it would have been reasonable to point out that the system had not had, nor could it be expected to have, any effect on the health of the affected fish stocks.

Nonetheless, some analysis of the economic conditions in the pelagic fishery was made in the Agency for Marine and Water Management's report. The Agency noted – with caveats about the unreliability of the financial statistics – that profitability had improved for the larger vessels that had remained in the industry, and that low profitability continued to be an issue mainly for smaller vessels and those included in the regional allocation system, rather than those included in the ITQ system. However, there was no attempt to evaluate the impact of the ITQ system as such: the vessels included in the system were not analysed separately from other pelagic fishing – not even in the descriptive statistics. The Agency report also noted that prices of pelagic fish had risen relative to other commercially fished species, making it even more difficult to distinguish the effects of the system itself on profitability and restructuring from the effects of the price changes.

Moreover, no analysis was made of the various constraints on the system apart from a discussion of the coastal quota system, which mainly focused on developments in catches and not on economic indicators. Strictly speaking, the official evaluation of the ITQ system does not, therefore, permit a meaningful assessment of the system's effect on the restructuring that it was intended to accelerate. Even before the system was introduced, one could predict that it would encourage structural change; and indeed, structural change has since taken place. However, it will probably never be possible to tell for certain how large the effect of the system actually was, and how large the effects of the limitations in the system were, for the restructuring of the pelagic fishery.

5. Concluding remarks

Adaptive marine environmental policy requires the development of new policy instruments and measures, but also the assessment and monitoring of policies and measures that are already used or are about to be introduced. The study of the Swedish ITQ system reported in this paper found that, even though the system was justified by the desire to speed up the restructuring of the pelagic fishery, the system's design meant that such restructuring was predictably slower than in the foreign systems that served as benchmarks. Data-gathering was also found to have been designed

such that it is now impossible to evaluate accurately how large the actual economic impacts of the system have been.

It is not necessarily a problem in itself that measures and instruments are not perfectly designed to begin with, or that perfect information-gathering is not ensured from the beginning. Indeed, in fisheries management and in marine environmental policy, continuous change in respect of instruments and measures as well as of methods of data-gathering can be seen as part of an adaptive management process, which is often necessary for the management of complex and dynamic ecosystems. However, it is thought-provoking that so much of what this study found to be problematic was predictable from the outset. This suggests that economic analyses and evaluations are given low priority – even in situations where economic incentive arguments are the basis for the policy instruments actually implemented.

Even in 2009, when the Swedish system was first introduced, it was obvious from experiences in other countries that prices and rental values of fishing rights would be absolutely central: both as signals to the actors involved, and as information sources for future evaluation. Despite this, no effort was made to make price information systematically available to the actors involved or to the authorities responsible. Also at the time, experiences from other countries indicated what the qualitative effects of the various constraints on the system would be. Again, despite this, there was no analysis of these points when the system in Sweden was introduced, and there does not seem to have been any discussion of how the system would eventually be evaluated or what information would be needed for such an evaluation.

Sweden is currently considering extending ITQs to other fisheries, and investigating what effects can be expected from such an extension. If more thought had been given to future evaluation when the system was first introduced, there would now be far better data to work with. The problem in this case is not that Swedish policymakers and civil servants might wish today that they had known in 2009 what they needed to know: they did know, but chose not to use that knowledge.

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