*Marine Resource Economics*, Volume 20, pp. 445–466
Printed in the U.S.A. 
0738-1360/00 $3.00 + .00


# Role of Subsidies in EU Fleet Capacity Management

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**Abstract** *Fisheries in the European Union (EU) continue to be overexploited by an overcapitalised fishing fleet, despite the best intentions of two decades of capacity adjustment programmes. This paper considers the progress of fishing capacity under the Multi-annual Guidance Programme and examines the impact of subsidies made available to the fishing industry. The underlying reasons for the modest impact on improved resource sustainability are considered, despite capacity reductions in nominal terms. These include the impact of subsidies on capacity development and issues surrounding the use of vessel decommissioning. The Danish fishing fleet case serves as an empirical example in this regard. Comments on the future capacity management regime and the role of subsidies in EU fisheries are offered.*

**Key words** Common Fisheries Policy, fleet capacity management, subsidies, Danish fishing fleet.

JEL Classification Codes D24, H20, Q22.

## Introduction

The main objective of this article is to address the role of subsidies in the arena of EU fleet capacity management, where the success of rebalancing EU fleet capacity with resource availability has been somewhat thwarted by inappropriate funding measures. Underlying issues surrounding the framework of capacity reduction initiatives have played a similar influential role. Therefore, the focus of this paper is as follows. The next section introduces the management implications of various types of subsidies in fisheries, with special focus placed on the use of vessel decommissioning. The evolution of EU capacity management and application of subsidies is then considered. The case of the Danish fishing fleet offers further insight into the mechanisms of capacity adjustment, in terms of decommissioning, modernisation, and renewal of vessels. The evolution of fleet production and efficiency indicators are also presented.[1] The paper is concluded with a discussion of the underlying issues of subsidy use in EU fleet capacity management and considers possible changes to the management regime.

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The author is grateful to Hans Frost for contributions and ideas during the writing of this paper. Further, comments on earlier drafts by Niels Vestergaard, Jens Kjærsgaard, and two anonymous referees are gratefully acknowledged. Any shortcomings, however, remain the responsibility of the author.

[1] Productivity indicators are highly influenced by the state of the resource (production input). Hence, to assess policy measures in relation to changes in productivity, time series of the exploited fish stocks should be incorporated. Given that this is currently outside the scope of this paper, discussions of linking productivity change to policy measures herein remain indicative.

The implementation of the European Common Fisheries Policy (CFP)[2] in 1983 was a product of lengthy negotiations following the adoption of the Exclusive Economic Zones (EEZs) in 1976, when it was decided that the European Community was best placed to manage fisheries in the waters under its jurisdiction. The aims of the CFP included the conservation of fish stocks, industry structures (such as fishing fleets), the common organisation of markets, and an external fisheries policy (negotiations and fishing agreements [Holden 1994; DG Fisheries 2003]). Of particular relevance to this paper was the adoption of a structural policy, which offered an opportunity to facilitate change in the fisheries sector by the means of granting Community financial aid, whilst upholding the overall structural policy objective[3] to, "promote harmonious and balanced development of this industry within the general economy and to encourage rational use of the biological resources of the sea."

The long-term objective of the structural policy has been to make the fishing sector economically viable, whilst contributing to a more selective and sustainable utilisation of available resources (Holden 1994). Another important objective has been to secure sound economic and social conditions for the enterprises and persons employed in the sector. In order to satisfy these objectives, Multi-annual Guidance Programmes (MAGPs) have sought to encourage a sustainable balance between the capacity of the EU fishing fleets and the available resources by first stabilising and then removing capacity from the fishery. This approach has been warranted as a result of the general failure of management to effectively deal with the underlying reasons for excess capacity and continued declines in many important commercial fish stocks. Indeed, Gulland (1990)[4] concluded that an average 40% reduction in fishing mortality was required to rebalance fishing capacity with available resources. These sentiments were further echoed by Lassen (1995) and showed that several commercial stocks were still under far too much fishing pressure.

In 2001–02, the European Commission initiated a reform of the CFP in order to address the current problems associated with EU fisheries management.[5] With respect to the capacity problem the Commission (COM(2000) 272 final, p.5) acknowledged that, "although the current exploitation rates are too high, they represent only a fraction of what existing fleet capacity is potentially able to exert if it were not for the constraints imposed by Community regulations, and in particular the quota allocations."

In connection with their proposal to reform the CFP in 2002, the Commission (COM(2002) 181 final, p. 3) further acknowledged that:

> If current trends continue many Community fish stocks will collapse….The fishing capacity of the Community fleet far exceeds that required to harvest the available fishery resources in a sustainable manner. The most recent scientific advice from ICES suggests that the level of fishing mortality of the main Community fish stocks needs to be reduced by between one-third and one-half, depending on the type of fishery and area concerned, in order to ensure sustainable fishing.

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[2] The CFP is defined by Article 39 of the Treaty of Rome and Council Regulation (EEC) No. 170/83 of 25 January 1983, based on the freedom of establishment (labour and capital movement) and relative stability in fishing opportunities. The original objectives of the CFP were based on the Common Agricultural Policy (*e.g.*, increasing productivity by promoting technical progress). This failed to consider negative externalities of fisheries production, which prevail when resources are common property.

[3] As described in Council Regulation (EEC) No. 101/76 and further amplified in Council Regulation (EEC) No. 4028/86.

[4] In a report of a group of independent experts advising the European Commission.

[5] A comprehensive review of the CFP reform proposals and accompanying capacity policies can be found in Lindebo, Frost, and Løkkegaard (2002).

The end product of the reform was an array of Council Regulations aiming to ensure the conservation and sustainable exploitation of fisheries resources, specifically addressing structural assistance and emergency measures for the scrapping (decommissioning) of fishing vessels.[6] The major framework of the CFP now in force builds on multi-annual management plans (in essence stock recovery plans), fishing mortality reduction, capacity reference levels of fleets, effort regulation, and greater scrutinisation of the use of subsidies. As a consequence, subsidies for fleet modernisation and renewal were phased out in 2005.[7] The Commission further acknowledged that any postponement of measures needed to deal with overcapacity would generate even greater social costs in the future, if fish stocks were allowed to continue their decline (COM(2002) 600 final).

But why have these problems arisen? OECD (1997, p.9) states that, "experience has shown that a regime which does not adequately limit fishing capacity may lead to overexploitation and poor economic performance. The main reason for the poor results is that these regimes do not give the fisherman the incentive to account for the costs of his fishing activity."

FAO (2001) identifies overcapacity as the major physical manifestation of the dissipation of resource rents often referred to by economists. In other words, some (or all) potential socio-economic gains of fisheries exploitation are dissipated into excessive capacity in the form of redundant vessels or redundant inputs in general. This happens because the use of the limited renewable resource is unpriced. FAO (2001) further consider that although excess capacity builds up due to the investment decisions of individual fishermen, the underlying fault is a regulatory one. In the absence of measures to correct a market failure in fisheries (stemming from free and open access to a public good), fishermen receive economic signals that encourage them to invest at excess levels from a fisheries point of view. In fisheries where the market failure has been resolved (*e.g.*, under rights-based management) this incentive disappears, as does overcapacity, in principle. Under such circumstances, fishermen are given explicit incentives to reduce investment in fishing capital, helping to mitigate the inherent problems of race to fish and dissipation of resource rents (OECD 1997).

The unleashing of overcapacity into the limited resources in EU waters has been rather evident in this respect and is a major reason for relying on a rather predominant capacity management approach to deal with the adverse consequences. Not only does the current fleet situation lead to continued pressure on fishing stocks, but the overcapitalised nature of fleets and underutilisation of fishing capacity also represent an economic waste to society (opportunity cost). The difficulties of trying to address biological imperatives while accommodating a multitude of political, economic, and socio-economic interests have also hampered the progress of the CFP and the overall structural policy. However, the implementation of rights-based management has not been a privilege of the Community as a whole, but the responsibility of each member state, and hence cannot be mandated within the current CFP set-up.[8] Further, the allocation of quotas to each member state makes the capacity problem a national one in terms of the associated waste of economic resources, while it cannot be a Community problem unless overcapacity creates a control problem.

Over the years, the policy initiatives that aim to ensure sustainable exploitation of fisheries in Community waters have been rather inconsistent with regards to re-

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[6] Council Regulations (EC) No. 2369/2002, 2370/2002, and 2371/2002.
[7] Some supports will remain to improve gear selectivity, fish quality, etc.
[8] The institutional context of the CFP is well described in Holden (1994).

ducing fleet capacity whilst simultaneously promoting and sustaining a competitive industry through the active use of subsidies. Direct economic incentives in terms of budgeted grants or subsidised lending for construction and modernisation will tend to result in capacity being maintained at an uneconomically high level, with adjustments to the structure of fishing capacity being delayed and catch rates being kept at lower levels. This has the effect of worsening the financial situation of firms that would be profitable (or more so) if the bankrupt part of the fleet were allowed to fold (FAO 2001). Subsidies available to the industry are a further indication of lack of economic efficiency, as well as the more general undesired use of public finances.

## Subsidies in Fisheries

The use of subsidies in fisheries has gathered worldwide attention in recent years through extensive work programmes and commissioned reports by many international organisations and fora (cf. World Bank 1998; FAO 2001; OECD 1997, 2002, 2003; WTO 2001; WWF 1998a,b, 2002; UNEP 1998, 2000). The general consensus has been that subsidies can be harmful to sustainability and may, among other things, help to encourage the buildup of capacity through raised expectations in the industry. Furthermore, the general effects of subsidies will tend to vary under different management regimes and depend on the status of resources. Subsidies in the EU have been under increasing scrutiny for a number of reasons, including the inclusion of fishing subsidies on the WTO agenda and the issue of coherence with other EU policies, such as sustainability, development, and environmental protection (IEEP 2002a,b).

### *Typologies and Impacts*

Under the International Plan of Action for Managing Fishing Capacity, the Food and Agriculture Organisation of the United Nations (FAO) has called for the reduction and progressive elimination of subsidies and economic incentives that contribute directly or indirectly to the buildup of excessive capacity (FAO 2001). In particular, they stress that firms will tend to invest in a fishery as long as there are profits to be made. If subsidies help to reduce costs of exploitation, then profits may still be ensured and incentives to invest will prevail. Although capacity-neutral subsidies may be applied to encourage fleet reduction, safety, fish quality, improved port infrastructure, conservation, and responsible fishing practices, actually targeting subsidies to specific fisheries or fleets may be difficult.

Structural changes as a result of subsidies tend to be two-fold. They either lead to changes in production of the individual vessels or changes in the overall number of vessels in the fleet, based on the underlying mechanisms with respect to levels of fishing effort. In some cases, both scenarios can be expected. Anderson (1986) shows the impact of subsidies on the cost and revenue structure and the open-access level of fishing effort in a static Gordon-Schaefer long-run equilibrium model. The basic argument is that the fishery will find an effort equilibrium level where revenues equal the exploitation costs and opportunity costs of the production factors in an open-access fishery. Although most fisheries are not generally open access, the underlying mechanisms still hold. If subsidies are applied to increase fish prices, for example, higher revenues will result and effort/capacity will be attracted until a higher equilibrium level is reached. A subsidy that lowers variable costs (*e.g.*, fuel) will have a similar impact. Arnason (1998) further shows that lump sum subsidies tend to increase aggregate effort to the extent that total capitalisation of the industry

is increased as a result. However, where effort can be effectively constrained, as generally done in EU fisheries, these effects do not materialise (Hatcher and Robinson 1998).

There is a range of subsidies that can have a direct or indirect impact on the level of fishing capacity/effort of the fishing fleet, including:

- Income support and unemployment insurance (*e.g.*, tax relief);
- Price subsidies and subsidies to processing and marketing (*e.g.*, minimum price);
- Access to third country waters;
- Subsidies of capital costs (*e.g.*, vessel modernisation and construction, soft investment loans);
- Subsidies of variable costs (*e.g.*, tax exemption for fuel, subsidised insurance);
- Subsidies for vessel decommissioning.

For example, the use of income support will tend to lower a fisherman's opportunity cost; *i.e.*, the difference in income that can be earned elsewhere will be marginalised and the fisherman is more likely to stay in the fishery. The same impact can be expected when revenues are enhanced through price supports or costs are reduced through tax exemptions on fuel or more favourable investment conditions. This will ultimately result in higher capacity/effort levels than would otherwise have been the case if inefficient or bankrupt vessel owners had left the fishery to seek more income in another industry. Further, it potentially increases the investment incentives (*i.e.*, greater profits are being made than if supports were not being applied).

Although these kinds of subsidies have been given less attention, mainly due the lack of transparency of national aid programmes, they are perceived to have a significant impact. Any financial instrument that helps to alter the cost/revenue structure of fishing operations will impact profitability and determine the likely investment responses by fishermen. The same can be argued for the application of third country agreements, where individual fishermen, in essence, are being subsidised to exploit resources in distant waters that would have been less profitable were fishermen to cover the fees for access themselves. However, if alternative income levels outside the fishery are close to zero (*i.e.*, vessels and skipper skills tend to be difficult to transfer to land activities), then this type of financial support may not necessarily alter the decision of whether to stay in or leave the fishery.

IFREMER (1999) show that explicit, but indirect, subsidies are imbedded in international fishing access agreements that compensate a third country for a given level of access for EU fishing fleets. This helps to subsidise a significant part of the effective costs of a distant water fleet. It can also be expected that the agreements play a pivotal role in alleviating the need for capacity reduction in some member state fleets, at least in the short term, although the exact extent by which this occurs cannot be verified here. It is nevertheless clear that the agreements act as a subsidisation of access to resources for private operators, and thus allow many vessels to maintain an active role (capacity) in fishing as a result.

It needs noting that there are subsidies that can prove more beneficial, if carefully defined and targeted. For example, supporting investments in new onboard satellite technologies may ultimately help to reduce the costs of government surveillance activities. The multi-species interaction of many fisheries may provide another alternative for using subsidies. For example, applying a price premium for North Sea whiting (which predates on juvenile cod) could result in a direct improvement in the North Sea cod stock, if the whiting stock is harvested more intensely as a result. Such finely tuned, targeted subsidies could have a very beneficial outcome in terms of improved cod stocks, and so outweigh the cost of the initial subsidy.

### *Use of Vessel Decommissioning*

Vessel decommissioning is often thought of as a management tool for regulating fisheries, which seeks to rationalise the size of fishing fleets (Holland, Gudmundsson, and Gates 1999). In addition, it can also be thought of as a form for subsidising the industry, as noted above. The success of these programmes relies heavily on whether fishermen can be drawn out of the fishery for future financial gain, as opposed to what they would otherwise gain if they remained in the fishery (Frost *et al.* 1995; Guyader, Daures, and Fifas 2000). Hence, the costs of decommissioning schemes can be quite expensive.

Munro (1998) specifies that there are at least two reasons for questioning the use of subsidies for vessel decommissioning:

- Incentives: A subsidised decommissioning programme may alleviate the overcapacity problem in the short term, but only at the cost of intensifying the problem in the longer term if the investment incentives are impacted. That is, authorities may succeed in creating the impression that every time the industry is in distress, external intervention will intervene to bail the industry out and thus reduce investment risk.

- Spillover effects: If vessel capital is simply relocated from one fishery to another fishery suffering from ineffective management, then benefits of capacity reduction in one fishery are at the cost of intensifying comparable problems elsewhere. Hence, we have to ensure that vessel decommissioning actually means permanent and physical scrapping of the vessel concerned.

Vessel decommissioning schemes could, therefore, in the long term actually intensify the problem of overcapacity worldwide. Clark, Munro, and Sumaila (2004) further conclude that decommissioning schemes can benefit conservation, provided that they are unanticipated by the vessel owners. Both conservation and economic efficiency goals may be negatively impacted if the schemes are anticipated. Jørgensen and Jensen (1998), using a simulation model for fishermen's investment decisions, support the view that reducing risk through repeated decommissioning schemes will raise levels of investment and may have significant impacts on local stability. Similar opinions are given by Hatcher and Robinson (1998).

A further consideration is that following the removal of vessels, remaining participants may be able to increase their effort in order to utilise a larger share of the quota, resulting in a similar level of fishing pressure on stocks. It can also be expected that the least efficient vessels are the first to accept financial compensation for leaving the fishery. Although these conditions will likely lead to an improvement in overall efficiency and economic performance of fishing fleets, there will likely be little impact on fishing effort (Hatcher and Robinson 1998). It is thus pertinent to not only ensure that re-entry of vessels does not occur, but also that remaining vessels do not expand their operations (at least initially), if the goals of stock improvement and long-term benefits of fleet reduction are not to erode. In this respect, it is also imperative that overall quotas are being respected in the first place.

Weninger and McConnell (2000) acknowledge that vessel decommissioning is often a politically acceptable policy that may improve biological and economic conditions in the short term, and with compensation given to exiting fishermen, the policy also seem to be acceptable to the industry. They support the notion, however, that the policy fails to address the underlying externalities in fisheries that create overcapitalisation, and hence in the longer term, problems accruing from capital investment will tend to persist in a post-decommissioning fishery. Further, in some

cases the incentives to invest will be reinforced to take advantage of improving conditions. It is perhaps here that I should note the similar impact of these schemes when compared to other more direct subsidies outlined in the previous section. Holland, Gudmundsson, and Gates (1999) draw on evaluations of vessel decommissioning schemes worldwide, identifying the same problems related to re-entry and investments in remaining vessels. They find, for a number of cases, that conservation goals have been thwarted and the economic cost of fish has increased, due to these problems prevailing in the post-decommissioning situation. Further, they note that funded vessel decommissioning leads to important social adjustments through asymmetric financial transfers to participants in the fishery, irrespective of whether conservation and efficiency goals are actually achieved.

In an international workshop on fishing vessel and license buyback programmes convened in La Jolla, CA, USA, March 2004, numerous case studies were presented to shed light on important application and design issues of vessel decommissioning schemes.[9] Preliminary conclusions from the workshop include:

- It is only a second-best solution to fishery management where defined property rights or other economic instruments are not in place. Capacity control is needed due to market failure leading to overfishing and perverse economic incentives.
- It should not be a long-term application (*e.g.*, use for short-term recovery plans, or to deal with problems of sunk costs during a shift in a management system).
- Industry participation is vital to improve transparency, legitimacy, and to lower the cost of programmes.
- Define clear objectives of programmes—biological, economic, *etc.*
- Do we target latent or active capacity? Removing active capacity first will result in greater reduction in fishing pressure, but may lead to reactivation of latent capacity. Removing latent capacity first may, thus, be the prudent approach.
- Do we target efficient or inefficient vessels? Vessels have different cost structures and different impacts on resources, and targeting will determine the successful outcome of programmes.

Finally, Hannesson (2004) considers that since the justification of vessel decommissioning lies in the realisation of expected future benefits, it may be a reasonable condition that programmes are ultimately funded by those remaining in the fishery (*i.e.*, no public subsidies should be involved). He further stresses that without such an approach, the cost of the programme will probably exceed the rent generated by the vessel decommissioning programme. Some form of cost recovery structure should, therefore, be implemented to justify the use of public funds for this purpose (Schrank, Arnason, and Hannesson 2003).

## The EU Fleet Capacity Policy

### *Fishing Capacity*

As discussed in the introduction, the issue of fishing capacity has been at the forefront of fisheries management concerns in recent years.[10] Fishing capacity has most often been defined as a physical input of fish production, such as vessel tonnage, engine power, and days at sea, and represents a proxy of variable costs of fishing

[9] Organised by the US National Marine Fisheries Service and the University of California San Diego.
[10] Regretfully, the role of subsidies in this respect has merited less attention.

operations.[11] Fishing capacity in the EU has historically been measured in terms of nominal gross tonnage (GT) of the vessel and engine kilowatt power (kW)—assuming full utilisation of fishing vessels. These characteristics have been measured, monitored, and registered as indicators of fishing capacity, as specified by Council Regulation (EEC) No 2930/86, and have been regarded as the most practical parameters for expressing fishing capacity of the fleets using active gears.[12]

In addition to this fishing capacity terminology, a further term known as fishing effort has been applied, commonly defined for operational reasons as an aggregate measure of tonnage, engine power, and fishing activity (days at sea). Since 1992, the two terms have worked in union to monitor desired fleet reductions in the EU.

A register of fishing vessels was set up in 1989 to allow the European Commission to implement and monitor the CFP. The register is a record of the physical characteristics of all commercial marine fishing vessels in the EU fleet. At the end of 2002, the register contained just over 90,500 fishing vessels, representing 7.26 million kW and 1.96 million GT. The indexed changes observed in the register over the last decade can be viewed in figure 1.

Considerable difficulties have been encountered in the measurement and registration of capacity, both in technical and administrative terms, and the lack of reliable and homogeneous capacity indicators should be seen as one of the main stumbling blocks in past and present capacity-reduction initiatives. For example, defining fishing capacity in terms of two inputs should be scrutinised. Fishing capacity, or the ability of a vessel to catch fish, is a highly complex concept and depends on multiple inputs. Although tonnage and engine power will significantly impact a vessel's catching ability, and monitoring of these inputs may provide a simple indicator of capacity, it should be acknowledged that other inputs that are not monitored might allow an increase in effective capacity.

## *Multi-annual Guidance Programmes*

In order to attain a sustainable balance between the capacity of the EU fishing fleet and the available resources, a new structural policy was implemented in 1983. This helped to establish a string of structural adjustment measures, including the introduction of the extensive MAGP capacity adjustment policy.[13] The MAGP set out a series of multi-annual capacity targets for all EU member states and their fleets. In order to remove excess capacity from fisheries, vessel decommissioning and effort reduction were the most frequent measures applied.[14] Other measures, such as joint enterprises, export to third countries, and reassignment for purposes other than fishing were also used, although to a much lesser extent.

In conjunction with these programmes, additional financial measures for *inter alia* vessel renewal and modernisation were also applied to help restructure the EU fishing fleet.[15] The main aims were to help improve safety and catch quality, *etc.*, to

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[11] In contrast to FAO, based on Kirkley and Squires (1999), who define capacity as an output measure of fish production. Applying the input definition to capacity adjustment programmes in the EU has clouded the assessment of impacts of capacity reduction and should be seen as one major reason for continued levels of overcapacity.

[12] Council Decision 97/413/EC.

[13] Further elaboration on MAGPs and EU fleet adjustment can be found in Lindebo (1999).

[14] Through temporary restrictions imposed on vessel activity (days at sea) since 1992. Although this measure may have addressed the objective of reducing fishing pressure on stocks, it allowed member states to reduce their capacity reduction targets, resulting in more modest cuts in the EU fishing fleet than what was ultimately needed for prudent fleet adjustment.

[15] If MAGP objectives were fulfilled.

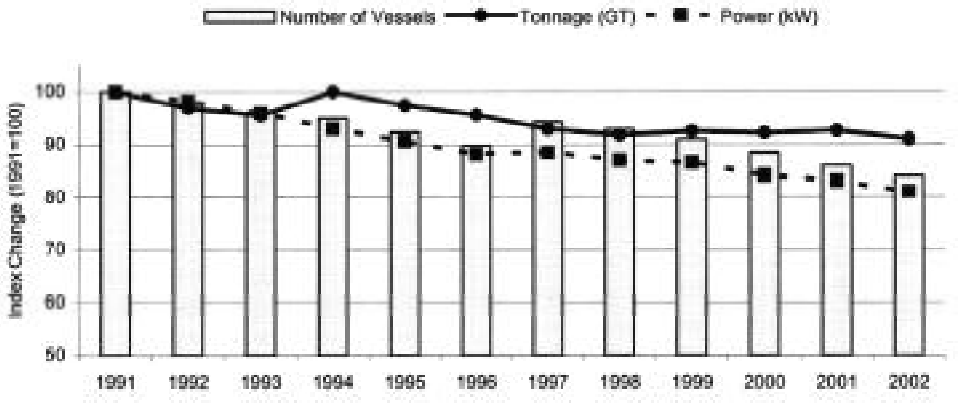


**Figure 1.** EU Fleet Register, 1991–2002
Source: Eurostat New Cronos database (extracted 21 April 2004), excludes Finland and Sweden.

secure sound economic and social conditions for the enterprises and the persons employed in the sector, and to create a reasonable, stable income level. The process has aimed at giving EU fishermen a financial incentive to leave the fishery, and so simultaneously provides economic relief for fishermen who wish to leave the fishery. Vessels remaining in the fishery should benefit from an improvement in the economic results through a reduction in fixed costs, improved catches, and greater competitiveness.[16]

Despite the introduction of MAGPs in 1983, it became clear that serious attention to fleet adjustment was required in the 1990s following rather modest fleet objectives and reductions seen during the 1983–91 period. In an attempt to improve the success rate of fleet capacity management, the EU fleet was subsequently segmented depending on how each vessel was geared towards fish stocks, defined on the basis of the zone fished, the species exploited, and the fishing gear used. Fleet segment reduction objectives were set in accordance with desired fishing mortality rates of certain fish stocks, 'weighted' on the basis of biological advice on fish stock overexploitation.[17] During the period 1991 to 30 June 2002, the EU fleet realised reductions of approximately 20%, both in terms of vessel tonnage and engine power, although to varying degrees across member states and fleet segments.[18]

Although most of the capacity reduction objectives of the MAGP were ultimately met, the translated effect of a similar reduction in fishing pressure on stocks did not materialise. Reasons for this could be connected to the continued and rather inconsistent availability of subsidies for the modernisation and renewal of vessels. After all, the clear objective was to reestablish capacity/resource balance. The adverse effects of other subsidies, helping to indirectly impact capacity and effort levels by influencing investment incentives and cost/revenue structures (as discussed in the previous section), are also considered to be of importance in this respect. Furthermore, factors including the continuous changes in fishery dynamics, complex fleet segmentations, amendments of fleet objectives, and the lack of seri-

[16] COM(96) 237 final.
[17] Council Decision 97/413/EC.
[18] COM(97) 352 final and COM(2002) 483 final.

ousness attached to required cuts in fishing opportunities to safeguard fish stocks have most likely played an important role.

The issue of technological progress is also deemed to have been influential in this respect. For example, despite EU fleet reductions of some 20% over the last decade, these nominal reductions have not accounted for technological advances or changes in productivity of vessels. For illustrative purposes, an annual 2% increase in productivity due to technological progress over ten years will need to be offset by a 22%[19] reduction in fishing capacity if *status quo* is to be maintained.[20] Furthermore, since an annual 2% increase is regarded as a rather modest estimate, and all production inputs are not under control allowing input substitution, a 20% nominal reduction in tonnage and engine power over ten years should not be regarded as a highly notable achievement. A study commissioned by the European Commission suggests that the impact of technological progress on fishing effort can indeed be significant and highly variable, both in spatial and dynamic terms (Banks *et al.* 2001). The study concludes that technological progress may undermine reductions in nominal capacity through an increase in productivity, and should be considered when addressing the needs for capacity reduction.

## *A New Community Fleet Policy*

At the end of 2002, the MAGP was discontinued following the reform of the CFP in response to the fairly modest results it managed to deliver. Under new regulations, however, tonnage and engine power measures of capacity remain in force. These indicators form the basis for new capacity reference levels of fishing fleets, intrinsically based on the MAGP objectives at the end of 2002 (table 1). These reference levels now serve as a maximum ceiling to capacity development of fishing fleets and will be used to gauge the status of fisheries in relation to available resources and fishing mortality reductions (especially under stock recovery plans).

The ongoing establishment of new regional advisory councils (RACs), with active stakeholder involvement, should also assist the process of establishing more prudent fleet policies. Here, stakeholders[21] will be able to contribute management advice to the Commission (*e.g.*, in relation to stock recovery plans) that, if implemented, should improve overall industry acceptance of the capacity adjustment policy. However, the RACs are still in their infancy, and it is too early to tell to what extent this stakeholder advice will influence the management approach.

The new capacity management approach no longer defines a set of specific capacity objectives for member states or fleets, as was the case under the MAGP. The adjustment of capacity will occur indirectly via limitations on fishing effort (days at sea restrictions) and new, multi-annual management plans (*e.g.*, fishing mortality reduction, stock recovery plans). For example, management plans will likely cause severe reductions in fishing opportunities in certain segments of the fleet, as currently seen with the recovery plans of the cod and hake fisheries in the North Sea. The reduction of fishing capacity in response to fishing effort limits will be the responsibility of member states, with the new Community fleet policy being asked to create the environment to encourage this capacity reduction. The main instrument to physically control fleet capacity is established via the reference levels of the individual member state and stringent entry:exit capacity ratios, and will be adjusted

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[19] Productivity increase of 22% is calculated by $P^*(1.02)^{10}$.
[20] Assuming constant returns to scale.
[21] This includes fishermen, industry representatives, NGOs, government, scientists, etc.

**Table 1**
MAGP Objectives, Fleet Situation, and Reference Levels of EU Member States

| Member State | Unit | Situation 2001 | Objective 2001 | Sit2001/ Obj2001 | Segment Compliance | Objective 2002* | Reference Level 1.1.2003** |
|---|---|---|---|---|---|---|---|
| Belgium | GT | 24,091 | 23,323 | 103 | 1/2 | 23,260 | 23,372 |
| | KW | 66,347 | 67,857 | 98 | 1/2 | 67,857 | 67,857 |
| Germany | GT | 68,766 | 81,973 | 84 | 6/7 | 80,965 | 84,262 |
| | KW | 160,562 | 170,050 | 94 | 6/7 | 166,890 | 175,927 |
| Denmark | GT | 99,663 | 132,539 | 75 | 4/4 | 132,706 | 132,706 |
| | KW | 364,030 | 463,437 | 79 | 4/4 | 459,526 | 459,526 |
| Spain | GT | 532,003 | 799,254 | 67 | 7/7 | 783,113 | 783,113 |
| | KW | 1,311,821 | 1,802,836 | 73 | 7/7 | 1,793,251 | 1,793,251 |
| France (mainland) | GT | 229,742 | 213,870 | 107 | 15/21 | 225,757 | 230,257 |
| | KW | 1,098,253 | 1,161,131 | 95 | 19/21 | 916,469 | 920,969 |
| Greece | GT | 108,739 | 120,755 | 90 | 5/6 | 119,910 | 119,910 |
| | KW | 637,207 | 654,172 | 97 | 5/6 | 653,497 | 653,497 |
| Ireland | GT | 64,412 | 69,649 | 93 | 2/3 | 83,167 | 86,981 |
| | KW | 185,276 | 199,009 | 93 | 2/3 | 215,939 | 230,226 |
| Italy | GT | 217,501 | 230,177 | 95 | 8/11 | 229,833 | 229,862 |
| | KW | 1,315,086 | 1,341,775 | 98 | 7/11 | 1,338,972 | 1,338,971 |
| Netherlands | GT | 179,942 | 145,520 | 124 | 5/7 | 145,520 | 213,139 |
| | KW | 426,867 | 423,161 | 101 | 4/7 | 423,161 | 527,067 |
| Portugal | GT | 116,968 | 195,885 | 60 | 10/10 | 194,756 | 194,756 |
| | KW | 403,245 | 497,246 | 81 | 10/10 | 492,844 | 492,844 |
| United Kingdom | GT | 255,634 | 250,684 | 102 | 6/8 | 269,789 | 286,120 |
| | KW | 953,733 | 1,066,463 | 89 | 7/8 | 1,065,278 | 1,129,194 |
| Sweden | GT | 50,183 | 51,159 | 98 | 4/6 | 51,436 | 51,993 |
| | KW | 243,302 | 261,856 | 93 | 5/6 | 261,029 | 261,028 |
| Finland | GT | 19,748 | 23,427 | 84 | 4/4 | 23,203 | 23,203 |
| | KW | 191,344 | 217,634 | 88 | 4/4 | 216,195 | 216,195 |
| Total | GT | 1,967,391 | 2,338,215 | 84 | - | 2,363,415 | 2,459,674 |
| | KW | 7,357,075 | 8,326,627 | 88 | - | 8,070,908 | 8,266,552 |

Source: COM(2002) 446 final.
Notes: *Commission Decision 2002/652/EC; **Commission Regulation (EC) No 1438/2003.

according to Commission Regulation (EC) No 1438/2003. For example, the reference levels will be adjusted downwards by the same amount leaving the fleet with public aid.

An overall reduction in the capital employed is the first, essential step towards improving economic performance of the sector. In this sense, public aid (subsidies) to investment in the fishing fleet has been counterproductive, promoting oversupply of capital by reducing costs and investment risks and thereby distorting competition. As a result, the Commission sought to restrict aid for modernisation, renewal, and export of vessels under the CFP reform. More specifically, the Commission sought to:

- Remove aid for new capacity;
- Remove aid for export of vessels and joint enterprises;
- Restrict modernisation aid (*e.g.*, safety, selective fishing gears, etc);
- Ensure that any fleet renewal takes place without any increase in fishing effort;
- Ensure that both fishing vessels and their licences are withdrawn from the fishery;
- Ensure that scrapping of fishing vessels is prioritised.

Consequently, all funds for modernisation and construction were phased out in 2005.

## *Financial Aid*

In support of the structural policy objectives, in 1993 all the common structural measures relating to fisheries were integrated into an overall system of EU structural funding under a single financial instrument, the Financial Instrument for Fisheries Guidance (FIFG). Community and national aid to the fisheries sector was on the order of € 2.66 billion for the period 1994–99. Of this figure, € 894 million was granted to vessel decommissioning and € 594 to renewal and modernisation, with the remainder being made available for aquaculture, port facilities, processing, and marketing. One-third of the total aid was sourced nationally.

FIFG structural aid allocations for 2000–2006 total € 3.6 billion (DG Fisheries 2001), and were slightly modified following the 2002 CFP reform to take account of adverse socioeconomic and regional impacts of fishing effort reductions, including actions for short-term emergency scrapping measures and the phasing out of modernisation and construction grants. The breakdown of community and national aid for fishing fleets is given in table 2. Emergency measures have been introduced to provide additional incentives to the owners of fishing vessels in order to urgently address overcapacity in fisheries where stocks are outside safe biological limits. To address this imbalance, a € 32 million emergency measure will allow member states to offer additional funds for scrapping vessels that are severely impacted.[22] The timeframe for this measure is 2003–06 to encourage rapid fleet adjustment. The Commission has used scientific advice on recommended reductions in fishing effort, linked to the perceived effect such reductions will have on Community fishing vessels in the fishing vessel register, to estimate the required removal of some 8,500 vessels, representing some 350,000 GT.[23]

In addition to national matching funding under FIFG, national financial trans-

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[22] A reduction of 25% or more in the fishing opportunities of the vessel concerned is used as an objective indicator of 'severe impact.'
[23] COM(2002) 190 final.

**Table 2**
Allocated EU Fleet Measures, 2000–2006 (€ million)

| | Adjustment of Fishing Effort* (1) | | | Renewal and Modernisation (2) | | | (2)/(1) |
|---|---|---|---|---|---|---|---|
| | FIFG | National | Total | FIFG | National | Total | |
| EU Total | 658.58 | 403.97 | 1,062.55 | 829.16 | 349.86 | 1,179.02 | 1.11 |

Note: *Vessel decommissioning, joint enterprises, and reallocation to third countries.
Source: IEEP (2002a).

fers also include a number of schemes initiated independently by the member states. These 'State Aids' include grants, interest subsidies, and tax reductions, and many published figures are believed to be understated (IEEP 2002a). Distortions in funding allocation among member states are also apparent, and may influence the relative competitiveness of their fleets.

Financial aid guaranteeing the minimum price of fish for fishermen has also been applied in the EU. If the market price is lower than this minimum price, Producer Organisations (POs) for example, may purchase fish for the minimum price and take it out of the market. Such schemes may or may not include an element of public subsidisation. In some countries, the funds available for POs are paid by the fishermen themselves when prices are high. Thus, under such conditions there is no element of subsidisation in the scheme, and it merely acts to equalise fluctuations of the market. In other countries, the government pays the whole or part of the amount for the withdrawal of fish, and thereby acts as a direct subsidy. In this regard, Hatcher (2000) outlines how the EU common market organisation for fisheries has provided indirect support for fishing fleets by paying compensation for fish landings that failed to find a market at specified minimum prices. Between 1983 and 1990, almost € 180 million was earmarked for such support. Since 1991, annual reports of the Court of Auditors of the European Communities show that annual expenditure on market support has been on the order of over € 30 million per annum (Hatcher 2000). It is unclear, however, what direct impact this has had on capacity adjustment.

The subsidisation of fisheries access agreements has been seen as a way to reduce capacity in the EU while securing employment and supplies of fish for the European market. However, fair competition in third country waters is distorted by the support given to the EU fleet in the form of different subsidies, in addition to general competition with national fleets (IEEP 2002a). The regulation of EU vessel operations is also scrutinised, as third country enforcement capabilities are often not of a high enough standard to enforce quota limitations. Third country agreements in 1999–2000 totalled just over € 400 million, with the largest sums going to Mauritania, Greenland, Angola, and Senegal (IEEP 2002a). There are also distortions among EU member states with regards to the beneficiaries of these subsidies, with Spain and France, in particular, reaping most of the rewards from these access agreements, perhaps as much as 80% of the total fisheries resources under the agreements. It is difficult to assess the exact economic and social benefits to the EU member states and the third country, although it appears that significant benefits accrue to commercial EU interests (IEEP 2002b).

## Rationalisation of the Danish Fleet

### *Fleet Adjustment*

As noted, a fundamental structural change in the fisheries sector has been required, mainly because of scarcity of resources in EU waters. The Danish fishing fleet has not been an exception. During the late 1980s and early 90s, the situation for the most important stocks for the Danish fishing fleet deteriorated, most notably for cod in the North Sea and Baltic Sea. The Danish authorities have, therefore, over the years focused on fleet reduction by means of vessel decommissioning whilst imposing rather stringent restrictions regarding granting permission for entry of new vessels into the fishing fleet. Simultaneously, the banking sector has been very reluctant to finance the renewal of vessels and exerted some pressure on fishermen to accept decommissioning aid despite incurring financial losses (Frost *et al.* 1995). The result has been that the capacity (size) of the Danish fleet has been significantly reduced over the last two decades, and the fishing fleet is now comparatively old, with an average age of over 30 years (Lindebo 2000).

Under the MAGP umbrella, as considered in the previous section, Frost *et al.* (1995) indicate reductions in Danish fleet capacity to have been almost 30% in terms of gross registered tonnage (GRT) during 1987–93. Further, during the 1992–96 MAGP period, the Danish fleet saw a 25% reduction in GRT and a 21% reduction in kW, in excess of official reduction targets. This can be compared to total EU fleet reductions of 18% and 12%, respectively, for the same period.[24] A slowdown in capacity reduction was seen under the 1997–2002 MAGP. Fleet reductions of 6% and 3.5% were observed for the period, in terms of GT and kW, respectively; again in excess of requirements since fleet reduction objectives by this time had already been satisfied.[25]

Although these fleet reductions should largely be attributed to the application of MAGPs, there are also other probable causes for capacity change. These include changes in productivity, fish prices, fuel prices, and other costs, as well as resource changes. Jensen (1998) also examines the impact of tax policies on investment in Danish fisheries, namely the application of a 65% deduction of depreciation expenses in the first two years. This deduction contributes to a positive net present value of the effective, after-tax price of capital. In this regard, he concludes that the relative after-tax user cost of capital and profitability in the fishery strongly influences investment behaviour, and has thus affected the level of fleet capacity.

The actual financial aid (subsidy) packages for the Danish fishing fleet during 1994–2002 are portrayed in table 3.

The funds for renewal and modernisation are rather striking, and the extent of private funds seems to suggest that there have been rather strong incentives to invest, despite downturns in commercial fish stocks. Most notably, over 50% of total funds have been earmarked for modernisation purposes during 1994–2002. This should perhaps be seen as a period of consolidation, since the industry has experienced a considerable downsizing trend. However, restrictions on the size of the fleet and strict entry:exit ratios have continued to ensure that the capacity adjustments undertaken have not been cancelled out by additions to the fleet.[26] It is nevertheless considered that creating incentives to invest in fishing vessels, indirectly improving their economic performance, is contradictory to the approach of streamlining fleet sizes to address the overcapacity problem.

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[24] COM(97) 352 final.
[25] COM(2002) 446 final and COM(2002) 483 final.
[26] For example, modernisation projects that resulted in an increase in capacity could only be granted funding if capacity was simultaneously removed from the fishing fleet.

**Table 3**
Actual Aid for Danish Fleet Measures, 1994–2002 (€ million)

| | EU FIFG Funds | National Funds | Private Funds | Total Funds | No. of Projects | Tonnage (GT) | Power (kW) |
|---|---|---|---|---|---|---|---|
| Vessel decommissioning | 41.08 | 40.01 | - | 81.09 | 572 | 20,088 | 72,102 |
| Joint enterprises | 0.46 | 0.46 | - | 0.92 | 1 | 390 | 810 |
| Vessel construction | 10.55 | 2.89 | 44.08 | 57.52 | 76 | 8,179 | 19,640 |
| Vessel modernisation | 34.28 | 8.15 | 120.35 | 162.78 | 2,477 | - | - |
| Total | 86.37 | 51.51 | 164.43 | 302.31 | - | - | - |

Source: Danish Directorate for Development (2003a,b).

The aim of allocating financial aid for vessel modernisation has been to rationalise the fishery, to improve the storage and quality of fish products, to promote more selective and environmentally friendly (including energy saving) fishing practises, to improve the working and safety conditions on board, and/or to allow better fisheries surveillance. A key economic objective has been improvement in the quality of fish landed, which, in turn, leads to increasing value in the future. There have also been strides to improve the competitiveness of Danish vessels in Community waters. In contrast, the aim of funding vessel construction has been to promote renewal and permanently adjust the structure of the fishing fleet. However, the strict capacity regulation in force, requiring at least an equal amount of capacity being withdrawn, meant that funded vessel construction was limited to only a handful of projects in the 1990s. Vessel owners have, therefore, tended to seek funding for modernisation in order to improve their status in the fishery.

### *Impact on Fleet Production and Efficiency*

What is of great interest is to assess whether the financial aid packages and associated fleet adjustment initiatives have had the desired impact on the Danish fishing fleet. By looking at the period 1994–2002, we observe that both the fleet size and overall catch have steadily decreased since the mid-1990s (figure 2). Thus, there is little evidence to suggest that reductions in fleet size during the period have resulted in improved catch opportunities.

Through further investigation, aggregate Danish catch rates (in nominal effort terms), have declined from 18.7 tonnes per GT in 1994 to 14.5 tonnes in 2002, with a peak of over 20 tonnes per GT in 1995 (table 4). Conversely, catch rates, in value terms, have increased slightly from 33.9 DKK per GT in 1994 to 36.9 DKK in 2002, with a peak in 1997. This seems to depict that despite fleet reductions over the period, catch rates in volume terms have not improved, whereas increases in fish prices have led to some improvement in catch rates in value terms. This trend is supported by analysing catch in relation to insurance value.[27] This defends the notion that despite fleet reductions in Denmark, the underlying catch opportunities and quota levels in EU waters have not allowed the remaining vessels to significantly improve their aggregate catch rates.

[27] However, catch per unit insurance value is still a partial productivity measure.

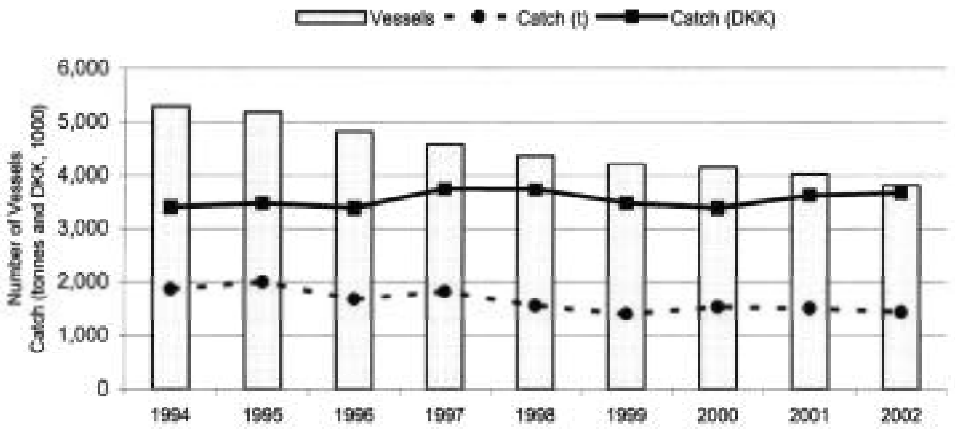


**Figure 2.** Danish Catch and Fleet Tonnage Development, 1994-2002
Note: Values at 2002 prices using GDP deflator.
Source: Directorate of Fisheries (2003) and online database www.fd.dk

**Table 4**
Aggregate Danish Catch Rates, 1994–2002

| | Catch per GT | | Catch per Insurance Value (million DKK) | |
|---|---|---|---|---|
| Year | Tonnes | DKK | Tonnes | DKK |
| 1994 | 18.7 | 33.9 | 383 | 594 |
| 1995 | 20.3 | 35.2 | 418 | 632 |
| 1996 | 17.2 | 34.6 | 359 | 643 |
| 1997 | 18.6 | 38.2 | 382 | 714 |
| 1998 | 15.8 | 38.0 | 321 | 708 |
| 1999 | 14.2 | 35.1 | 287 | 664 |
| 2000 | 15.0 | 33.1 | 283 | 603 |
| 2001 | 15.1 | 36.1 | 276 | 651 |
| 2002 | 14.5 | 36.9 | 264 | 671 |

Note: Values at 2002 prices using GDP deflator.
Source: Directorate of Fisheries (2003) and online database www.fd.dk

Of significant importance is that the Danish fleet consists of vessels that, in general, are able to switch fishery during the fishing seasons. Given that several of these fisheries are not access regulated, the result is that the policy has not reduced overcapacity in the most profitable fisheries (*e.g.*, cod fishery) and consequently too much effort is still aimed at these fisheries. Given the poor development of the vital demersal Danish catches, the main purpose of relieving the pressure on fish stocks and balancing capacity with the fishing possibilities has not been achieved. Most notably, catch statistics show how Danish catches of cod have steadily declined from over 90,000 tonnes in 1996 to only 31,500 tonnes in 2003 (Directorate of Fisheries 2004). This also explains why despite significant fleet reductions during the 1980s and 90s, the Danish authorities have pursued further vessel decommissioning in recent years in response to stock recovery plans and declines in fleet profitability.

It should be noted, however, that unilateral reductions in capacity by one member state will not have the desired effect of stock rebuilding if others member states do not reduce their fleets correspondingly.[28] It is, therefore, likely that some fisheries exploited by Danish fishermen have also, to some extent, been affected by the actions of neighbouring countries.

Although it is profoundly difficult to directly link fleet reduction with the evolution of capacity and efficiency of Danish vessels, a capacity analysis using Data Envelopment Analysis (DEA) may provide valuable information on the status of fleet segments. The estimation of full capacity output shows the extent to which each vessel could expand its catch output compared to best practice vessels (Färe, Grosskopf, and Lovell 1994; Kirkley and Squires 1999). Lindebo (2004) applies DEA to annual aggregated catch and vessel input data to assess capacity utilisation scores for the trawler segment for 1996-2002. Here, the capacity utilisation scores range from 0 to 1, where 1 represents full capacity utilisation, and is an indicator of the level of average fleet efficiency (table 5).[29]

The scores seem to indicate that the trawler segment has seen slight improvements in efficiency over the period, but not to any significant extent. The moderate increase in scores may be the result of the decommissioning of less efficient vessels during the period, but other factors, such as resource status, may also be involved. Lindebo (2004) further shows that the industrial fleet segment has improved in terms of capacity utilisation over the period, from 0.42 in 1996 to 0.71 in 2002. Results for the Danish seine fleet also portray a situation of higher capacity utilisation (*e.g.*, 0.83 in 2002). Indeed, Jørgensen and Jensen (1998) indicate that vessel decommissioning programmes in the late 1980s helped pave the way for improvements in the Danish seine fleet. Regretfully, it is outside the scope of this paper to analyse economic performance and observed fleet changes with respect to the direct application of subsides.

## Discussion

As shown in this article, the role of subsidies with respect to capacity management is rather comprehensive and may be highly influential. We have seen that, despite the best intentions of EU (and Danish) authorities, little success has been achieved with regards to achieving a long-term, sustainable balance between the fishing fleet and available resources. The continued call for stock recovery plans and emergency

**Table 5**
Average Capacity Utilisation Scores—Danish Trawler Fleet

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| Mean | 0.51 | 0.61 | 0.61 | 0.64 | 0.69 | 0.72 | 0.67 |
| St. dev. | 0.28 | 0.27 | 0.28 | 0.27 | 0.23 | 0.25 | 0.26 |
| Observations | 117 | 105 | 104 | 100 | 126 | 134 | 130 |

Source: Lindebo (2004).

[28] However, unilateral reductions in fleets should still improve the economic performance at the national level, since the relative quota levels will remain the same under the relative stability principle.
[29] Refer to Lindebo (2004) for further elaboration.

scrapping measures is clear evidence of this. The misguided use of subsidies for fleet renewal and modernisation has played an important role in the past, but so have a range of factors that are vital to the successful outcome of capacity-reduction initiatives (*e.g.*, design of vessel decommissioning schemes, impact of technological progress). More discrete uses of subsidies (*e.g.*, access agreements, fuel subsidies, tax relief) that help to influence the cost/revenue structure of fleet operations are also likely to have impacted the levels of capacity and effort. These mechanisms have, however, been more difficult to quantify with respect to the fleet capacity initiatives in the EU.

It is also relevant to refer back to important underlying issues when assessing the capacity problem. The current EU management regime and quota system inherently sends the wrong signals to fishermen through the implementation of inappropriate regulation. The theory of fisheries economics indicates that fisheries can be regulated efficiently if market forces, under rights-based regimes for example, are allowed to dictate the evolution of fishing fleets. This creates an environment that removes incentives for competitive build-up of excessive capacity and fishing effort under race to fish conditions, an otherwise rational response by fishermen to rents existing in the fishery (Gordon 1954). A management strategy that is based on output constraints and the internalisation of externality problems, through use of, for example, landing taxation or individual property rights, would lead to divesting of capital in the fishery and a gradual optimisation of fleet capacity (Scott 1955, 1979; Crutchfield 1979). This would, in time, lead to the overcapacity issue being of little concern. FAO (2001) recognises, however, that the range of capacity management methods is often constrained by socio-political and technical considerations. To some extent, this remains the largest stumbling block for fisheries management in the EU.

The fundamental issue of capacity definition needs to be addressed, which may allow for a better understanding of the moderate results in terms of stock recovery attained under the capacity reduction programmes. Defining capacity as an input of production rather than the FAO (1998) output definition of capacity means that capacity reductions cannot be directly related to catch output in an analytical framework. That is, it is difficult to gauge what effects, if any, the removal of vessel inputs through decommissioning schemes will have on the resource base. Since the main aim of policymakers has been to reduce fishing pressure on stocks, establishing the linkage between vessels and catch output is of the utmost importance, and remains a serious obstacle to managers.

This article has noted that the use of vessel decommissioning should only be considered as a second-best solution to the problem of overcapacity. Nevertheless, the application of decommissioning may be useful to deal with short-term management problems, such as current stock recovery plans, to aid the restructuring of the sector under conditions of poor resource availability. What must be made clear from the commencement of any such initiatives, however, are the objectives. For example, if the desire is to assist a specific fishery, then specific targeting of vessels and fleets for decommissioning is vital. This should allow ‘capacity-reducing’ subsidies to be applied in a more prudent, effective manner, helping to ensure the desired objectives are met, and are more cost effective in the process.

As highlighted in the academic literature, effective restriction on entry is essential if decommissioning schemes are to have any real impact. If not restricted, or if effort levels of the remaining vessels are allowed to increase, then the aid given to decommissioning should be regarded as an effort-enhancing subsidy. Hence, these schemes should be scrutinised along the same lines as other investment subsidies. In this context, it is also noteworthy that the application of long-term decommissioning schemes will tend to result in increased industry expectations and reduced invest-

ment risk, and thus has as an undesired impact on capacity development. The application of a comprehensive (and expensive) short-term decommissioning scheme is, therefore, favoured.

The need for restructuring and renewal in the fleet is necessary and may require some form of subsidisation to improve safety, gear selectivity, *etc.* Although it is the general view of the author that construction and modernisation subsidies should not be granted, as they will tend to enhance capacity and give mixed signals to the industry, a well-planned programme may allow such subsidies to have positive effects. Here, it is essential that comprehensive capacity reductions are assured under a distinct first phase of decommissioning, without other forms of subsidisation for renewal, ensuring that there is a sound basis for a vibrant industry. Carefully targeted subsidies could then, in a distinct second phase, allow specific initiatives and projects to seek other objectives. The previous application of subsidies in the EU capacity management setup, especially those that clearly helped to enhance capacity and effort, were not structured this way. Here, the process would be further aided if we obtained greater understanding of underlying economic incentives to help predict fishermen's reactions to subsidies and various policy initiatives in a practical management setting.

## References

Anderson, L.G. 1986. *The Economics of Fisheries Management,* Revised and Enlarged Edition. Baltimore, MD: The Johns Hopkins University Press.

Arnason, R. 1998. Fisheries Subsidies, Overcapitalisation and Economic Losses. A. Hatcher and K. Robinson, eds. *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*. Portsmouth, UK: CEMARE.

Banks, R., S. Cunningham, W. Davidse, E. Lindebo, A. Reed, E. Sourisseau, and J.W. de Wilde. 2001. *The Impact of Technological Progress on Fishing Effort. Call for Tenders No. XIV-C-1/99/02*. Brussels, Belgium: European Commission.

Clark, C., G. Munro, and U.R. Sumaila. 2004. Subsidies, Buybacks and Sustainable Fisheries. Presented at the International Workshop on Fishing Vessel and License Buy-Back Programs. La Jolla, CA, USA, 22-24 March.

COM(96) 237 Final. Proposal for a Council Decision Concerning the Objectives and Detailed Rules for Restructuring the Community Fisheries Sector for the Period from 1 January 1997 to 31 December 2001 with a View to Achieving a Balance on a Sustainable Basis between Resources and their Exploitation. Brussels, Belgium, 29.05.

___(97) 352 Final. Annual Report to the Council and to the European Parliament on the Results of the Multi-annual Guidance Programmes for the Fishing Fleet at the end of 1996. Brussels, Belgium, 11.07.

___(2000) 272 Final. Report from the Commission to the Council: Preparation for a Mid Term Review of the Multi-annual Guidance Programmes (MAGP). Brussels, Belgium, 10.05.

___(2002) 181 Final. Communication from the Commission on the Reform of the Common Fisheries Policy ("Roadmap"). Brussels, Belgium, 28.05.

___(2002) 190 Final. Proposal for a Council Regulation Establishing an Emergency Community Measure for Scrapping Fishing Vessels. Brussels, Belgium, 28.05.

___(2002) 446 Final. Annual Report from the Commission to the Council and the European Parliament on the Results of the Multi-annual Guidance Programmes for the Fishing Fleets at the end of 2001. Brussels, Belgium, 01.08.

___(2002) 483 Final. Report from the Commission to the Council and the European Parliament on the Intermediate Results of the Multi-annual Guidance Programmes for the Fishing Fleets at 30 June 2002. Brussels, 03.09.2002.

___(2002) 600 Final. Action Plan to Counter Social, Economic and Regional Consequences of the Restructuring of the EU Fishing Industry. Brussels, Belgium, 6.11.

Commission Decision 2002/652/EC of 29 July 2002. Amending Decisions 98/119/EC to 98/131/EC in order to Prolong the Multi-annual Guidance Programmes for the Fishing Fleets of the Member States until 31 December 2002. Official Journal L215, 10.08.

Commission Regulation (EC) No 1438/2003 of 12 August 2003. Laying Down Implementing Rules on the Community Fleet Policy as Defined in Chapter III of Council Regulation (EC) No 2371/2002. Official Journal L204, 13.08.

Council Decision 97/413/EC of 26 June 1997. Concerning the Objectives and Detailed Rules for Restructuring the Community Fisheries Sector for the Period from 1 January 1997 to 31 December 2001 with a View to Achieving a Balance on a Sustainable Basis between Resources and their Exploitation. Official Journal L175, 03.07.1997.

Council Regulation (EEC) No 101/76 of 19 January 1976. Laying Down a Common Structural Policy for the Fishing Industry. Official Journal, 19, L20, 28.01.1976.

Council Regulation (EEC) No 170/83 of 25 January 1983. Establishing a Community System for the Conservation and Management of Fishery Resources. Official Journal, 26, L24, 27.01.1983.

Council Regulation (EEC) No 2930/86. Defining the Characteristics of Fishing Vessels (Official Journal L274, 25.09.1986), later amended by Council Regulation (EC) No 3259/94 (Official Journal L339, 29.12.1994).

Council Regulation (EEC) No 4028/86 of 18 December 1986 on Community Measures to Improve and Adapt Structures in the Fisheries and Aquaculture Sector. Official Journal, 29, L376, 31.12.1986.

Council Regulation (EC) No 2369/2002 of 20 December 2002. Amending Regulation (EC) No 2792/1999 Laying Down the Detailed Rules and Arrangements Regarding Community Structural Assistance in the Fisheries Sector. Official Journal L358, 31.12.2002.

Council Regulation (EC) No 2370/2002 of 20 December 2002. Establishing an Emergency Community Measure for Scrapping Fishing Vessels. Official Journal L358, 31.12.2002.

Council Regulation (EC) No 2371/2002 of 20 December 2002 on the Conservation and Sustainable Exploitation of Fisheries Resources under the Common Fisheries Policy. Official Journal L358, 31.12.2002.

Crutchfield, J.A. 1979. Economic and Social Implications of the Main Policy Instruments for Controlling Fishing Effort. *Journal of the Fisheries Research Board of Canada* 36:742–52.

Danish Directorate for Development. 2003a. Evaluation of FIFG 1994-99, July, Copenhagen.

___. 2003b. Mid-term Evaluation of FIFG 2000-06, November, Copenhagen.

DG Fisheries. 2001. Facts and Figures on the CFP: Basic Data on the Common Fisheries Policy. Brussels, Belgium: European Communities.

___. 2003. Introduction to the CFP—The Common Fisheries Policy. http://europa.eu.int/comm/fisheries/pcp/intro_en.htm

Directorate of Fisheries. 2004. Y*earbook of Fishery Statistics 2003*, September. Copenhagen, Denmark: Fiskeridirektoratet.

Eurostat New Cronos Database. http://europa.eu.int/comm/eurostat/

FAO 2001. *Managing Fishing Capacity: A Review of Policy and Technical Issues*. FAO Fisheries Technical Paper 409, S. Cunningham and D. Greboval. Rome, Italy: FAO.

Färe, R., S. Grosskopf, and C.A.K. Lovell. 1994. *Production Frontiers*. New York, NY: Cambridge University Press.

Frost, H., R. Lanters, J. Smit, and P. Sparre. 1995. *An Appraisal of the Effects of the Decommissioning Scheme in the Case of Denmark and the Netherlands*. Esbjerg, Denmark: DIFER/SUC publication 16/95.

Gordon, H.S. 1954. The Economic Theory of a Common Property Resource: The Fishery. *Journal of Political Economy* 62:124–42.

Gulland, J.A. 1990. The "Gulland" Report. Report of an Independent Group of Experts on Guidelines for the Preparation of Multi-annual Guidance Programmes in Relation to the Fishing Fleet for the Period 1992–1996. Chaired by J.A. Gulland. Internal document for the European Commission. Brussels, Belgium.

Guyader O., F. Daures, and S. Fifas 2000. A Bioeconomic Analysis of the Impact of Buyback Programs: Application to a Limited Entry Scallop French Fishery. *2000 Proceedings of the International Institute of Fisheries Economics & Trade* (IIFET), Corvallis, Oregon.

Hannesson, R. 2004. Do Buyback Programs Make Sense? Presented at the International Workshop on Fishing Vessel and License Buy-Back Programs. La Jolla, CA, USA, 22-24 March.

Hatcher, A. 2000. Subsidies for European Fishing Fleets: The European Community's Structural Policy for Fisheries 1971–1999. *Marine Policy* 24 (2000):129–40.

Hatcher, A., and K. Robinson. 1998. Overcapacity, Overcapitalisation and Subsidies in European Fisheries. Proceedings of the First Workshop held in Portsmouth, UK, 28-30 October. Portsmouth, UK: CEMARE publication.

Holden, M. 1994. *The Common Fisheries Policy: Origin, Evaluation and Future*. London, England: Fishing News Books.

Holland, D., E. Gudmundsson, and J. Gates. 1999. Do Fishing Vessel Buyback Programs Work: A Survey of the Evidence. *Marine Policy* 23(1999):47–69.

IEEP. 2002a. Subsidies to the European Union Fisheries Sector. Paper Commissioned by WWF European Fisheries Campaign, October, London, England.

___. 2002b. Fisheries Agreements with Third Countries: Is the EU Moving Towards Sustainable Development? November, London, England.

IFREMER. 1999. Evaluation of Fishing Agreements Concluded by the European Community. European Contract No 97/S 240-152919.10.12.1997, IFREMER/CEMARE/CEP, Final Report, September, Brussels, Belgium.

Jensen, C.L. 1998. Investment Behaviour and Tax Policy. *Marine Resource Economics* 13(3):185–96.

Jørgensen, H., and C.L. Jensen. 1998. Overcapacity, Subsidies and Local Stability. A. Hatcher and K. Robinson, eds. *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*. Portsmouth, UK: CEMARE publication.

Kirkley, J., and D. Squires. 1999. Measuring Capacity and Capacity Utilisation in Fisheries. *Managing Fishing Capacity: Selected Papers on Underlying Concepts and Issues*, FAO Fisheries Technical Paper 386. Rome, Italy.

Lassen, H. 1995. The "Lassen" Report. Report of the Group of Independent Experts to Advise the European Commission on the Fourth Generation of Multi-annual Guidance Programmes. Chaired by H. Lassen DGXIV/298/96-EN. Brussels, Belgium.

Lindebo, E. 1999. Fishing Capacity and EU Fleet Adjustment. FOI Working Paper No. 19/1999. Copenhagen, Denmark.

___. 2000. Capacity Development of the EU and Danish Fishing Fleets. FOI Working Paper no. 10/2000. Copenhagen, Denmark.

___. 2004. Trends in Economic Capacity of the Danish Fishing Fleet, 1996–2002. Acta. *Agricultur Scandinavica Section C. Food Economics* 1(4):207–21.

Lindebo, E., H. Frost, and J. Løkkegaard. 2002. Common Fisheries Policy Reform—A New Capacity Policy. FOI Report no. 141. Copenhagen, Denmark.

Munro, G. 1998. The Economics of Overcapitalisation and Fishery Resource Management: A Review. A. Hatcher and K. Robinson, eds. Ov*ercapacity, Overcapitalisation and Subsidies in European Fisheries*. Portsmouth, UK: CEMARE.

OECD. 1997. *Towards Sustainable Fisheries: Economic Aspects of the Management of Living Marine Resources*. Paris, France: OECD.

___. 2002. OECD Workshop on Environmentally Harmful Subsidies: Defining and Measuring Subsidies. OECD Workshop, Paris, 7-8 November.

___. 2003. Environmentally Harmful Subsidies: Policy Issues and Challenges. Paris, France: OECD.

Schrank, W.E., R. Arnason, and R. Hannesson. 2003. *The Cost of Fisheries Management*. Aldershot, UK: Ashgate Publishing.

Scott, A. 1955. The Fishery: The Objectives of Sole Ownership. *Journal of Political Economy* 63:116–24.

___. 1979. Development of Economic Theory on Fisheries Regulation. *Journal of the Fisheries Research Board of Canada* 36:725–41.

UNEP. 1998. Fisheries Subsidies, Overfishing and Trade. Prepared by G. Porter. Environment and Trade Series No. 16, Geneva, Switzerland.

___. 2000. Fisheries Subsidies and Overfishing: Towards a Structured Discussion. Prepared by G. Porter for the Economics and Trade Branch of the Division of Technology, Industry and Economics, November, Geneva, Switzerland.

Weninger, Q., and K.E. McConnell. 2000. Buyback Programs in Commercial Fisheries: Efficiency versus Transfers. *The Canadian Journal of Economics* 33(2):394–412.

World Bank 1998. Subsidies in World Fisheries: A Reexamination. M. Milazzo, World Bank Technical Paper, WTP 406. Fisheries Series. Washington, DC, USA.

WTO. 2001. Ministerial Declaration, Fourth Session, Document WT/MIN/DEC/W/1, Doha, Qatar, November.

WWF. 1998a. The Footprint of Distant Water Fleets on World Fisheries. Geneva, Switzerland: WWF.

___. 1998b. Too Much Fishing Fleet, Too Few Fish: A Proposal for Eliminating Global Fishing Overcapacity. Prepared by G. Porter. WWF: Geneva, Switzerland.

___. 2002. Turning the Tide on Fishing Subsidies: Can the WTO Play a Positive Role? Geneva, Switzerland: WWF.