

## Chapter 6

### The Environmental Effects of Transfers to the Fisheries Sector<sup>1</sup>

*The environmental effects of GFTs provided to the fisheries sector closely follow from the economic effects analysed in the previous chapter. This chapter presents the analysis from a different perspective using the checklist approach developed for the environmentally harmful subsidies*

*Transfers can result in increased catches in the short run but, over the long term, they will generally lead to lower fish stocks. However, it is clear that the type of management regime in place will strongly influence the extent to which transfers adversely affect the sustainability of fish stocks. One of the key findings of this report is that the effectiveness of enforcement is just as big a determinant of the environmental effects as the type of management regime.*

This chapter analyses the environmental effects of transfers by applying the checklist methodology for identifying and assessing environmentally harmful subsidies that has been developed as part of a horizontal program in the OECD (OECD 2003c, 2005). As will be seen, this approach is essentially the same as the “matrix approach” used by the OECD in its earlier work on fisheries trade liberalisation where the effects of policy changes have to be assessed in the context of the policy setting in which they are provided (OECD 2003a).

The focus in the chapter is on the impacts of transfers on fishery resources and the impact of transfer removal is assessed in terms of the effect on the relevant fish stocks. The chapter does not cover the effects of changes in financial support on other aspects of the marine ecosystem that may be affected by fishing activity (such as incidental catch, the marine benthos, pollution from fishing vessels and so on). While such effects are important, their inclusion in the analysis at this stage would obscure the most important and direct environmental effect. In addition, the key environmental variable in much of the policy debate over the provision of fishing transfers is primarily the target fish stocks, rather than the accompanying environmental issues.

1. This chapter was prepared by the Fisheries Division of the OECD Directorate for Food, Agriculture and Fisheries. An earlier version of the chapter was presented to the OECD Workshop on Environmentally Harmful Subsidies held in Paris, 3-4 November 2003.

## A Brief Review of the Checklist Approach<sup>2</sup>

The checklist approach developed for the OECD workshop builds on earlier OECD work undertaken on subsidy reform which examined the employment and income effects of subsidies, as well as on the environmental effects (OECD 1998, 1999). The narrower environmental focus arose in an effort to isolate the environmental aspects of subsidy removal from the other impacts of policy reform in the analysis. Pieters (2003) provides a detailed explanation of the checklist approach developed for the OECD workshop. In brief, the objective of the checklist is to help identify those subsidies the removal of which would lead to an environmental improvement, other things being equal. It is intended as a “quick scan” which will provide an indication of the relative magnitude of the impact that the subsidies actually, or potentially, impose on the environment. It is designed to equip policy makers with an understanding of the key issues involved in the removal of subsidies. Importantly, it is not intended to be a substitute for more detailed analysis of the economic, environmental and social effects of subsidy removal (or provision). Rather, the checklist serves to provide a signpost on directions for policy makers to concentrate further analytical efforts – it is a guiding tool for identifying priority areas for policy reform.

The checklist addresses two interrelated issues:

- the effects that subsidies have on consumer and producer decisions; and
- the link between these decisions and the environment.

The effects of subsidy removal on producer and consumer decisions will depend crucially depend on the overall policy framework within which the transfer is given, the availability of alternatives and the nature of competition in factor and product markets. The policy setting in which a subsidy is provided is particularly important in the case of the fisheries sector as fisheries are generally subject to some form of management by governments, usually in the form of restraints on the catch, allowable effort, entry to the industry, and so on. Such a “policy filter” will largely determine the potential responsiveness of producers to changes in subsidy regimes. In the context of the fisheries sector, the policy filter is primarily the management regime under which the transfer is provided.

The link between producers’ and consumers’ decisions and rates of environmental harm also depends on the conditionality of the subsidy. The concept of conditionality arises because the provision of subsidies is usually conditional on some conditions being met. The more obtaining a subsidy is contingent on attaining certain levels of input or output, the deployment of a particular technology or the use of a particular input, the more direct will be the link between the subsidy and its environmental effects. The main mechanism for determining the strength of the link is by identifying the points of impact of the subsidies. The points of impact refer to the points at which a transfer leads to different responses of producers and consumers with respect to their modes of production, production and consumption levels. This conditionality will then have different impacts on the rates of exploitation of fisheries resources. While all subsidies translate into either revenue increases or cost reductions, it is useful to highlight some important differences in transfer transmission. Usually the following broad points of impact are distinguished:

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2. As with the other chapters in this Part of the report, the terms subsidy and transfer are used interchangeably.

output (where revenue increases are conditional on the volume of production), input (production cost reductions) and profits and income (where revenue increases irrespective of volumes produced) (Pieters 2003).

The simplified version of the checklist is presented schematically in Figure 6.1. The key steps in the checklist are:

1. Provide a description of the subsidy, focusing on the structure of the incentives provided to producers and consumers from provision of the transfer.
2. Determine the extent to which the policy filter limits the negative consequences of the subsidy.
3. Determine the availability of alternative products or methods to those being subsidised. The key issue here is whether the implementation of more environmentally benign alternatives is being hampered by the subsidy under scrutiny.
4. Determine the extent to which the conditionality of the subsidy leads to higher volumes of production or consumption or to higher levels of use.
5. Identify the degree of market power that exists in the market.

### Applying the Checklist to the Fisheries Sector

The checklist consists of a number of stages which can be summarised as:

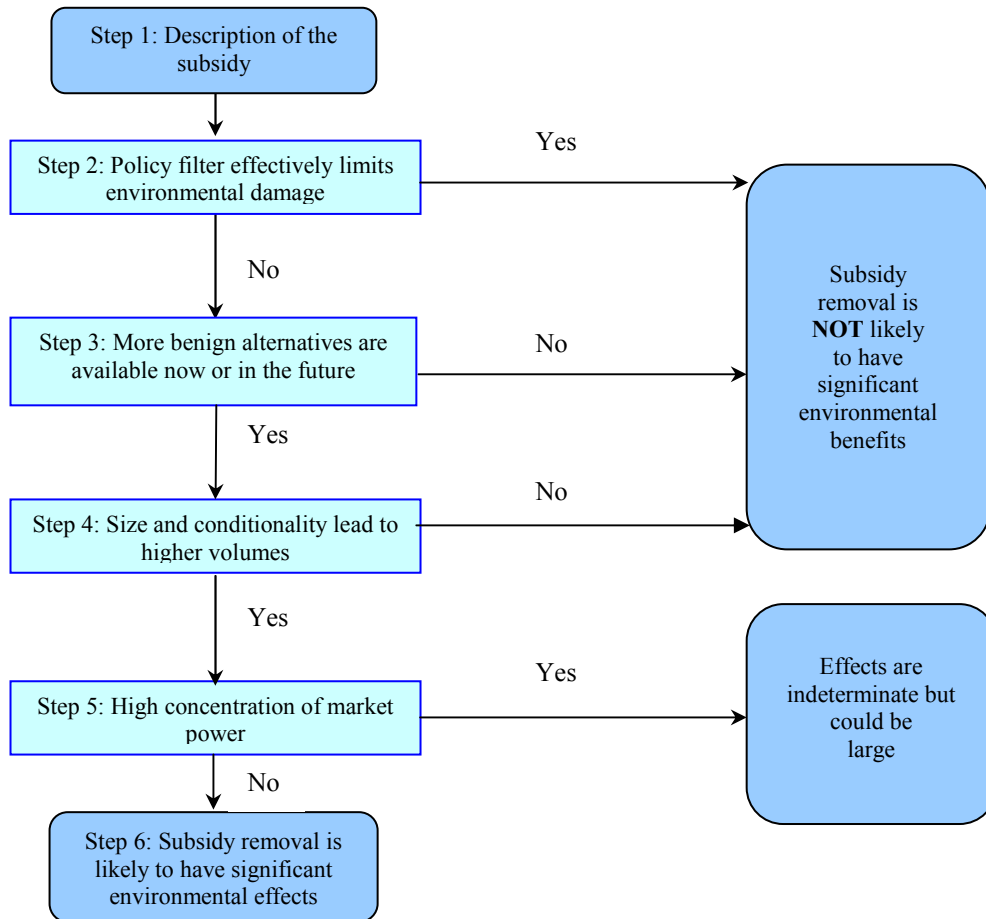
- The policy filter;
- Availability of substitutes;
- Conditionality of the transfer; and
- Extent of market power.

The *policy filter* is the key determinant of the environmental impact of transfers to the fishing sector. The policy filter primarily refers to the management regime governing the fisheries sector, in particular to the extent to which fish catches are effectively restricted. This determines the ability of fishers to respond to policy changes such as the provision or removal of transfers. The better the incentives are aligned to ensure that economic and environmental outcomes are mutually reinforcing, the less scope there is for transfers to be environmentally harmful. This can be illustrated with a simple example. If production is constrained by, say, an effectively enforced quota then a transfer to fisheries production may have little or no effect on fish stocks. It will merely represent an internal transfer within the economy from the government to the fishing sector, albeit with the associated deadweight losses and economic inefficiencies that arise from such transfers. So removing the transfer, while maintaining the quota, will leave exploitation and stock levels unchanged. Alternatively, if fish production is not constrained in some manner, then the transfer will have an effect on either incomes or costs of fishers and, by increasing profits (at least in the short term), will provide an incentive for increased exploitation of fish resources with adverse environmental consequences.<sup>3</sup>

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3. This result holds in the long term even for those fish stocks that are currently under-exploited (see Clark 1990; Hannesson 2001).

Figure 6.1. Schematic representation of the checklist



Source: Pieters 2003.

The *availability of substitutes* raises several interesting issues, but remains a secondary consideration to the policy filter in terms of the checklist. This stage determines what technologies and products are likely to replace the previously subsidised products and modes of production and whether these substitutes are more environmentally benign. In principle, the provision of transfers to the construction of fishing vessels and to the use of particular types of fishing gear or techniques can have the effect of locking in specific technologies and hampering the implementation of alternatives. In some cases, transfers are given to assist the introduction of fishing gear that is considered to be more environmentally friendly than current technologies (such as bycatch reduction devices). The key questions here are whether transfers are the most appropriate policy instrument to be employed in this situation and whether there is a net social benefit, taking all aspects into account, from the provision of the transfer.

*Conditionality* is not really an issue in the fisheries sector. As will be seen in the next section when discussing the different types of transfers, almost none of the broad categories of transfers are conditional on the maintenance of any given level of

production or input use. This characteristic of fisheries transfers differentiates the sector from some other sectors where a number of transfers are tied to production volumes (that is, a certain amount per unit of output). The only exception to this may be the use of certain price guarantee schemes where governments pay fishers an amount per kilogram of fish if the price falls below a certain level. These schemes are generally triggered in times of declining domestic demand, increasing competition from imports, declining world prices or increasing domestic supplies. The schemes have the effect of insulating fishers from market signals and can serve to encourage fishers to maintain production levels in the face of economic signals that may indicate that such a course may be economically and environmentally unsustainable. In this regard, they have very similar effects as market price support measures such as tariffs and other border protection schemes.<sup>4</sup>

Similarly, the question of *market power* does not generally arise in the case of transfers to the fisheries sector. The input and output markets are relatively competitive, although this does vary from country to country. In some parts of the sector, there is a high degree of vertical integration between fishing and processing. The provision of transfers to the various stages of production in highly integrated firms can compound the environmental effects of transfers. Integrated firms can shift costs and income around within their corporate structure to maximise profits in response to changes in relative costs resulting from policy measures (such as transfers).

## Applying the Policy Filter

### *Management regimes*

Management regimes can be defined and classified in a number of ways. In an earlier version of the kind of approach used here, Hannesson (2001) identified three stylised management regimes: open access; catch control; and effective management. The characteristics of the three stylised regimes are summarised in Table 6.1. The three regimes are readily recognised as situations that, while highly simplified, reflect the key features of management regimes in the real world. Most OECD countries fall between the catch control and effective management regimes. While there has been a gradual shift in many OECD countries from catch control towards effective management, as more and more restrictions are placed on entering particular fisheries, most countries remain closer to catch control than effective management.

In this study (as in Hannesson 2003), an expanded version of the stylised management regimes is used. This focuses on four key aspects of management regimes:

- whether there are any controls on fishers (that is, open access);
- extent of catch controls;
- extent of effort controls; and
- the existence of any property rights structure.

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4. The distinction needs to be made between price guarantee schemes which operate within countries (or groups of countries such as the EU) and border price support such as tariffs.

**Table 6.1. Attributes of Stylised Management Regimes Used in Hannesson (2001)**

	<b>Open access</b>	<b>Catch control</b>	<b>Effective management</b>
<b>Catch level</b>	Outcome of competition among firms ignoring fish resource constraints	Limit set by management authority	Limit set by management authority
<b>Number. of vessels</b>	Same as above	Outcome of competition for a maximum share of a given catch	Limited by cost minimisation of industry firms or by management authority
<b>Other capacity elements (gear, technology, etc.)</b>	Same as above	Same as above	Limited by cost minimisation by fishing companies. Can be partially limited by management authority.

*Source:* Hannesson (2001, p. 6).

Where there is **no control** of the fishery in terms of either the amount of fish caught, fishing effort or property rights, fishers compete for the resource and no regulatory effort is exercised. In general, the expected effects of transfers are observed over the longer term – overexploitation of stocks, longer-term decline in catches, higher intramarginal profits, increased capital and labour attracted to the industry, and resource rents competed away to zero. Depending on the starting point (whether the fishery is above or below the maximum sustainable yield), catches may rise in the short term as transfers increase the profitability of the industry before falling as the stock is exploited beyond the maximum sustainable yield.

In a management regime where there is **catch control**, transfers will not have an effect on fish stocks or catches of fish (by definition), provided that the catch is set at a sustainable (equilibrium) level and effectively enforced. If there is no control on fishing effort (through restrictions on the number of boats or how they are used), then the intramarginal profits will increase, attracting additional labour and capital to the sector with the result that resource rents are still competed away. In addition, the overcapitalisation of the fishing fleet would increase pressure on fisheries management authorities to raise the allowable catch. There are also potential issues regarding discarding and high-grading as fishers attempt to maximize the value of their catch.

**Effort controls** primarily take the form of restrictions on the number of vessels that are allowed to operate in a fishery, the amount of time they are allowed to fish and restrictions on the fishing gear and techniques that may be used. Despite the best efforts of regulators, it is not always possible to identify and control all the variables that determine the effort that fishers can bring to bear on fish stocks and it is possible that fishers can expand their effort along uncontrolled dimensions to increase effective effort. For example, the effort regulations in a particular fishery may specify restrictions on boat size, engine power and days at sea, which still leaves scope for fishers to expand fishing effort by increasing the use or effectiveness of other inputs such as labour and the amount or type of fishing gear. This problem in turn makes it difficult for fisheries managers to set the appropriate level of effort controls as the effect of a given level of effort on catches and fish stocks necessarily remains uncertain. Moreover, the effect is unlikely to

remain constant over time as the industry adapts to new restrictions, thereby potentially resulting in a race between the development and application of new regulations on one hand and the implementation of effort-increasing measures by fishers on the other. The problems of input stuffing associated with effort regulations are highlighted in a number of studies, including Beddington and Rettig (1984) and OECD (1997, pp. 112-7).

The addition of regimes based on **property rights** to the use of catch and effort controls adds a further dimension to the available menu of management regimes. Property rights can be used in conjunction with either catch controls or effort controls, with the most common form of property right being individual quota rights (which may or may not be tradable). Rights based regimes significantly alter the incentive structure facing fishers. They no longer have the incentive to race for fish as they can concentrate their efforts on catching their allowable catch in order to maximise profits (although this can lead to problems of high-grading and discards, as in the case of catch control regimes). Nor do they have an incentive to increase the fishing power of their boats beyond that which is needed to catch their allocation at minimum cost. Individual rights can also be defined for fishing effort, although this is less common in practice. It is also more problematic in terms of effective enforcement as the incentive to increase effort along uncontrolled dimensions remains; effort rights can generally only be defined along limited key dimensions (such as boat length, gross tonnage, days at sea, power, etc).

As noted in Hannesson (2001, 2003) and OECD (2003), the effect of transfers on the actions of the fishers, and hence on the fish stocks, will also depend on whether the fish stock is under-exploited or over-exploited (that is, whether fish stocks are above or below the level providing maximum sustainable yield). This distinction is particularly significant when considering the short term and long term effects of particular types of transfers under different management regimes. However, for most of the transfers under consideration, there is no difference in the long-term effects on fish stocks whether the stocks are initially under-fished or over-fished. The exceptions will be addressed in the following discussion of individual transfer categories.

### *Management, research and enforcement expenditure*

#### *Description*

It is well recognised that governments need to intervene in fisheries in order to ensure an efficient use of common fishery resources. The absence of such intervention will generally lead to overexploitation of fish stocks and reduced returns to the sector in the longer term. To facilitate this, governments provide a range of services to the sector including management, research and enforcement (OECD 2003b). Management consists of establishing and administering management regimes and adapting existing regimes. Research is required to underpin management as the success of government intervention depends on the managers having an adequate knowledge about the status of fish stocks and the linkages with the ecosystem. The success of management is also critically dependant on the monitoring, surveillance and enforcement of fisheries rules and regulations. It is worth noting that, in the case of research and enforcement in particular, there is a significant likelihood of diminishing marginal returns, with increased expenditures on research and enforcement services not necessarily leading to commensurate increases in expected returns to the sector (OECD 2003b).

In OECD countries, governments generally pay for the costs of management, research and enforcement. However, a number of countries, including New Zealand, Australia and



Iceland, are now recovering a sizable portion of the costs from industry. Other countries, such as Canada and Norway, charge user fees for some aspects of management (although not as part of a broader cost recovery programme). Moreover, the provision of a number of fisheries services (particularly some research and enforcement functions) are being outsourced to private providers or provided through joint ventures between public and private agents, reflecting a further shift away from exclusive government provision of management, research and enforcement (OECD 2003b). Such developments reflect the implementation of a beneficiary pays principle in the provision of services in those countries, more general budget pressures on governments and the increased use of co-management (much of which has accompanied the introduction of management shifts towards instruments such as individual transferable quotas).

### *Points of impact*

In general, the government provision of management services reduces the production costs of the industry. While the main point of impact is on the input side, it is also the case that industry benefits from effective management through more sustainable exploitation of fish stocks and increased returns to the industry. As a result, these expenditures can have an impact on the income side in the longer term through increasing the sustainability of fish stocks, although the effect is primarily through reduced input costs. Table 6.2 shows the main point of impact for this transfer category as well as for the other transfers in the typology.

Similarly, research expenditures reduce the costs of the industry as they would otherwise have to bear the costs themselves. A usual justification for the public provision of research is that it is a public good and that the benefits from the research flow beyond the fishing sector to the broader community. While this is true for many kinds of research (such as general research into ecosystem functioning, etc), it is not necessarily universally the case. Some forms of research may have a significant impact on the input costs of fishing operators. For example, research into improved gear technology, gear selectivity and so on is primarily directed at improving the productivity of fishing operations. Much of this research benefits the industry directly and it is not clear that the public good arguments usually associated with publicly funded research necessarily apply (Arnason and Sutinen 2003; Cox 2003). The extent to which research can be classed as a public good is a grey area.<sup>5</sup>

As with management expenditure, government payment of enforcement services has an impact on the input costs of fishing firms and, to a lesser extent, incomes.

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5. Research aimed at improving stock assessments is such a grey area. It benefits the industry by improving the knowledge base on which management settings are based. It also benefits the broader community in terms of an improved understanding of the marine resources of the community. Moreover, it is hard to exclude anyone from the benefits of such research and, once undertaken, it is generally available to whoever can make use of it.



**Table 6.2. Typology of fisheries transfers and their main points of impact**

Category	Description	Input	Output	Income
<b>Management, research and enforcement expenditure</b>	Management (administration, international obligations)	X		X
	Research (stock and economic assessment, productivity improvements, etc)	X		X
	Enforcement	X		X
<b>Infrastructure expenditure</b>	Community infrastructure (lighthouses, navigation facilities, search and rescue services)	X		
	Fishery sector specific infrastructure (landing quays, auction halls, fishing ports)	X		
<b>Payments for access to third country waters</b>	Government to government payments (not recouped from the fishing fleet)	X		X
<b>Transfers for vessel decommissioning and licence retirement</b>	Permanent capacity retirement (vessel scrapping, licence withdrawal)			X
	Permanent capacity transfer			X
<b>Transfers to labour retirement and retraining</b>	Permanent labour retirement (aid to retraining and pre-retirement)			X
	Temporary labour retirement			X
<b>Transfers to capital costs</b>	Construction (direct payments, loan guarantees, interest transfers)	X		
	Modernisation (direct payments, loan guarantees, interest transfers)	X		
<b>Transfers to variable costs</b>	Direct payments, loan guarantees, fuel tax exemptions	X		
<b>Income support and employment insurance</b>	Community income support (regional aid, small scale fisheries aid, development aid)			X
	Individual income support (direct payments to boat owners and employees)	X		X
	Employment insurance			X
	Temporary capacity retirement (laying up payments)			X
<b>Direct price support</b>	Market stabilisation schemes price guarantee schemes (other than border measures)		X	X
	Marketing and promotion schemes	X		X

Source: OECD.

### *Application of the policy filter*

Government provision of management, research and enforcement services without charging for their use reduces the costs faced by fishing firms and raises their potential

profits. In the absence of property rights and catch or effort controls (that is, effectively open access), this leads to increased profits in the industry in the short term and to greater effort being applied to the fishery (both by existing vessels and by new entrants). In the long term, the profits and resource rent in the industry will decline to zero, or may be negative. The long term effect on stocks is the same whether or not the fishery is over-fished or under-fished at the time the transfer is introduced. If the fishery is initially over-fished, fish catches will decline and the fish stock will be lower in the long term. Conversely, if the fishery is initially under-fished, fish catches will increase initially but will eventually settle at a lower level in the long term due to extra effort flowing to the fishery.

When catch controls are effectively applied to the fishery, then the transfer will not have any effect on fish catches or the fish stock, by definition. When, even with catch controls, there are no constraints on effort there is a strong incentive to increase effort due to the higher potential profits initially caused by the transfer. With more effort being applied to catch the same quantity of fish, profits will decline and there may be extra pressure on the management regime to increase the allowable catch. If this occurs, then the effect will be the same as if there were no controls at all.

When effort controls are applied to a fishery, then the free provision of management, research and enforcement services will not have an effect on stocks, provided that the effort controls are effective in restraining catches. In the absence of effective effort controls, fishing firms have an incentive to engage in input stuffing and fish stocks will be reduced in the long term due to the effort creep in the fishery. As with the case of no controls above, the short term response in terms of catch levels will differ depending on whether the fishery is initially under-fished or over-fished.

The introduction of property rights in addition to the use of catch or effort controls adds a further dimension to the analysis. Under the combination of catch controls and property rights, the introduction of transfers in the form of free provision of management, research and enforcement services will not have an effect on fish stocks (provided that the catch level is set at a sustainable yield). With individual catch rights, fishing firms have no incentive to become involved in a race for fish or to increase effort or capital or variable inputs above the minimum cost level to catch their quota. As a result, the transfer will increase the returns to the industry as it represents a transfer from taxpayers to the industry.

In principle, the combination of effort controls and property rights will mean that there will be no long-term effect of transfers in the form of the free provision of management, research and enforcement services on fish stocks. However, unlike individual catch rights, individual effort rights do not reduce the incentive for fishers to engage in input stuffing. As a result, the effectiveness of such a regime in restricting overall effort expansion and catches is reduced, relative to individual catch rights. If there is effort creep, there will be a long-term reduction in fish stocks. The pattern of fish catches in the move to lower fish stocks will, once again, depend on whether the fish stocks are initially under-fished or over-fished.

**Table 6.3. Effects of Free Provision of Management, Research and Enforcement**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Management, research and enforcement expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

### *Infrastructure expenditure*

#### *Description*

Expenditure on fisheries infrastructure includes payment for the construction and maintenance of harbours and fishing ports, construction of peripheral harbour infrastructure (roads, water, sewerage, etc), installation and maintenance of landing equipment, construction of auction halls, lighthouse and navigation facilities and search and rescue facilities. OECD governments have traditionally paid for fisheries infrastructure. While a number of OECD countries levy a user charge on the industry for the use of facilities, the extent of such charging is not known with great certainty.

Fisheries infrastructure is generally regarded as having the characteristics of public goods: they can be used by more than one user at a time (non-rivalry) and it is either physically difficult or economically infeasible to exclude users from benefiting from the facilities (non-exclusivity) (Cornes and Sandler 1996).<sup>6</sup> In reality, only a limited range of infrastructure facilities have the characteristics of pure public goods, namely lighthouses and navigation equipment. Other types of infrastructure can suffer from congestion (for example, as a result of large numbers of vessels in a harbour competing for space at wharves or off-loading facilities) or exhibit a degree of excludability so that the benefits are enjoyed by a restricted group (such as auction halls and landing facilities).<sup>7</sup>

Determining the degree of subsidisation attached to the free provision of infrastructure is contentious and revolves around three key issues. The first issue concerns whether other users of such infrastructure (for example, charter boat operators, commercial cargo companies) are required to pay for access. If they do, then the free provision of such facilities to the fishing sector amounts to a transfer. The second issue focuses on whether the fishing industry is the primary beneficiary from the provision of the infrastructure. If this is the case, then an element of subsidisation occurs. Third, the general infrastructure charging policy of some countries may not require industries to contribute to the costs of constructing and maintaining ports, airports, railways, roads and

6. Footnote on the technical aspects of public goods.

7. The latter are usually referred to as club goods.

so on. They may regard such projects as general development to be funded out of general tax revenue. At the same time, many countries are introducing user pays principles as a means of rationing use of facilities and relieving congestion (for example, through road charging, airport taxes, etc). The pricing of such access is difficult and many of the issues are common with other sectors with significant infrastructure requirements.

### *Points of impact*

The main point of impact from the provision of infrastructure is on the production costs of fishing firms. Without government funding for these facilities, the industry would clearly have to pay for them themselves.

### *Application of the policy filter*

In the absence of user charges for the use of government provided infrastructure, the costs of the fishing industry are reduced and potential profits increased. The results in terms of the effects on fish stocks under the various combinations of management parameters are analogous to the results for the government provision of management, research and enforcement services.

**Table 6.4. Effects of Free Provision of Infrastructure**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Infrastructure expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

### *Payments for access to third country waters*

#### *Description*

A number of countries, mostly distant water fishing states, negotiate agreements with coastal states which involve the granting of access to fish resources within the exclusive economic zone (EEZ) of the coastal state. The payment for access to the fish resources may involve an explicit monetary transfer, the transfer of fishing technology, assistance with improving fisheries management institutions, the provision of market access in the fishing country, or some combination of these. Payments can also be more implicit and be couched in terms of cooperation in a range of areas outside the fishing sector such as defence, development aid and so on. The transparency of these access agreements varies widely and the full extent and types of the payments is not well known.

### *Points of impact*

The transfer element arises from the fact that these payments are primarily made by the government of the fishing country to the government of the host country and are not usually recouped from the fishing industry. This therefore reduces the costs of fishing for the industry for gaining access to resources outside their own EEZ.<sup>8</sup>

### *Application of the policy filter*

The effects of payments for access on fish stocks will differ between the country providing the payments (the subsidising country) and the country providing the access to its resources (the host country). Agreements to provide access for foreign fishing fleets represent a transfer of effort between the two countries. The effects on fish stocks will depend on the state of fleet capacity and fish stocks in both countries as well as on the management regimes in place.

Looking first at the subsidising country, if there are no controls in place in its fisheries, then paying for its fishing fleet to have access to the host country's EEZ will result in the shift of capacity out of its own EEZ. This displaced capacity will then be replaced by new capacity in the subsidising country's EEZ. The mechanism for this is relatively simple: as fishing vessels leave the domestic fishery to fish in the host country, stocks will recover as less effort is applied, leading to increased potential profits and an incentive for more capacity to enter the fishery. There would then be no net effect on the subsidising country's fleet capacity or fish stocks in the longer term. This outcome holds regardless of whether the fishery was initially over-fished or under-fished.

If there are catch or effort controls in the subsidising country, then the effect on the subsidising country's fish stocks would also be zero for a similar reason as for the case of no controls. The removal of capacity would either not have an impact on catches or fish stocks or would be replaced by new capacity/effort so that the net effect would be zero. Similarly, in the case where there are property rights, the net effect would be zero: the subsidising country's fleet would have no incentive to leave their EEZ unless the expected profits from operating in the host country's EEZ were greater than those from operating in their own EEZ. If this was the case, then the departing capacity would be replaced by new capacity as there will be an excess supply of quota in the subsidising country's fisheries and quota prices will be driven down, thereby allowing for new entrants.

The impacts on the fish stocks of the host country will be different, particularly in the cases where there are no property rights. If there are no controls in the host country, the introduction of the foreign vessels will have an impact on catches if they enjoy a cost advantage over the host country fishing fleet – if no such advantage exists, then the foreign vessels would have no incentive to operate in the host country's EEZ. Cost advantages could arise in a number of ways: more recent technology, higher labour productivity, better targeting of stocks, better on-board handling and storage facilities, etc. It could also be the case that the foreign vessels are currently operating in a situation of excess capacity in their own EEZs, in which case they are only seeking to recover their variable costs. This could be exacerbated if the foreign vessels also get transfers for, say, capital and variable costs. If such cost advantages exist, then the effect on the host country fish stocks would be to reduce them over the longer term. In the short term,

8. There is some contradiction, however, in that most countries do not charge their domestic fishing industry for access to fish resources in their own EEZs.

catches would rise if the host country fishery was initially under-fished (and decline if it were over-fished), with the fish stocks eventually declining to a lower level.

If the host country has catch controls in place in its fisheries, then the introduction of foreign vessels would increase competition for the total catch and, depending on the extent of cost advantages enjoyed by the foreign vessels, would displace some of the host country's fishing vessels. This could then place pressure on the fisheries managers to increase the allowable catch to compensate for the reduced fishing opportunities of the host country fleet. This would clearly be an inappropriate response if the host country fish stocks were over-fished. However, if the stocks were under-fished, then it may be perceived that the total allowable catch could be increased to accommodate the foreign vessels and still provide for the domestic vessels. The under-exploitation of fish stocks is one of the reasons given for shifting capacity between countries. In this case, there will not be a long-term effect on fish stocks. If the host country has effort controls in place and the foreign vessels displace some (or all) of the domestic vessels, then total effort will remain the same and (subject to the remarks made earlier about input stuffing) there will be no effect on stocks. If the foreign vessels represent additional capacity, then the fish stocks in the host country will be reduced in the long term.

In the case of property rights in the host country, the subsidising country would be buying up the rights in the host country and providing them to its fishing vessels free of charge. This represents a transfer from the taxpayers of the subsidising country to the quota owners in the host country and would have no effect on fish stocks.

In summary there are unlikely to be any effects on the fish stocks of the subsidising country. The effects on the fish stocks of the host country will depend on whether the incoming capacity displaces or adds to existing capacity and the effectiveness of the management and enforcement in the host country.

### *Transfers for vessel decommissioning and licence retirement*

#### *Description*

Transfers for vessel decommissioning and licence retirement can take the form of payments for permanent vessel withdrawal through buy-back programs, permanent licence withdrawal and transfer of vessels to other fisheries (either domestically or internationally). It is one of the largest items of government financial transfers in OECD countries (OECD 2000). Governments generally introduce such payments to address problems of excess capacity and over-exploitation in their fisheries with the objectives of reducing overcapacity, increasing economic efficiency and alleviating pressure on fish stocks. The design and implementation of decommissioning and licence schemes varies significantly both between and within countries. For example, some countries require that decommissioning payments be tied to the physical scrapping of vessels while others allow vessels to be shifted to another fishery (in which case the payment is for the removal of capacity from a particular fishery rather than reducing the overall capacity in the country). Some schemes are intended to remove latent capacity or effort instead of capacity or effort that is currently engaged in fishing.

#### *Points of impact*

Transfers in this category have an impact on incomes in the industry. They represent a direct transfer from the government to fishers leaving the fishery (or the industry). They

will also have an effect on the incomes of the fishers who remain in the fishery as both competition and congestion in the fishery are reduced and stocks recover.

**Table 6.5. Effects of payments for access to third country waters**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Payments for access to third country waters – subsidising country	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels entering the domestic fishery are more efficient
Payments for access to third country waters – host country	Over-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Reduced stocks if TAC increases	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with reduced catches in the short term	Reduced stocks
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Catches may increase if TAC increased	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with increased catches in the short term	Reduced stocks

Source: OECD.

### *Application of the policy filter*

This group of transfers is intended to reduce capacity and effort in a fishery. The outcome of such schemes depends heavily on their design and on the management of the capacity and effort that remains in the fishery. There has been significant debate about the efficacy of many of these schemes in achieving their objectives both from an environmental and economic perspective (Arnason 1999 Holland, Godmundsson and Gates 1999; Munro and Sumaila 1999). If there are no controls in place in a fishery, then such transfers will have no effect on fish stocks as new vessels will enter the fishery to replace the scrapped vessels. Hannesson (2003) notes that an exception to this may arise if the capacity of the fleet and the level of effort have expanded beyond the long term equilibrium level, but vessels are remaining in the fishery as revenues may still be



sufficient to still cover their variable costs. In this case, decommissioning transfers may assist in the adjustment to the long term equilibrium.

If there are catch controls, the effect on fish stocks will be zero as, in the absence of barriers to entry, the vessels being decommissioned would be replaced by new vessels (unless the fleet capacity is above the long term equilibrium as discussed in the previous paragraph). If the fishery is initially over-fished, then the transfers will have no effect on stocks unless the allowable catch is also reduced. Such a combination of policy changes would have the effect of reducing capacity, reducing catches and increasing stocks. A decommissioning program will increase stocks if there are effort controls in place, provided that the controls are an effective barrier to new vessels entering the fishery. To an extent, there will still be an incentive for the vessels remaining in the fishery to engage in input stuffing in response to the lower level of effort, increased stocks and greater profits. However, given that most effort controls are defined with vessels as one of the main control parameters, this impact may not fully offset the increase in stocks resulting from the initially decommissioning scheme.

In the case where there are property rights, the effects of vessel decommissioning or licence retirement schemes on fish stocks would be negligible. The owners of the quota or effort rights have benefit from capacity leaving the fishery

The provision of decommissioning transfers also has an impact on the risk faced by fishers in their investment and production decisions. The existence of vessel and licence buy-back programs can create expectations in the industry that the government will cover losses that may arise from excess investment in vessels, thereby reducing the risk-adjusted discount rate used in making investment decisions. Munro and Sumaila (2001, p. 25) conclude that transfers used in vessel buyback schemes, if they come to be widely anticipated by industry, ‘can, and will, have a decidedly negative impact’ on resource management and sustainability. This effect will flow through a reduction in the expected capital costs of firms.

**Table 6.6. Effects of transfers to decommissioning and licence retirement**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to decommissioning and licence retirement	Over-fished	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks Reduced stocks if new vessels more efficient
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels more efficient

Source: OECD.

In summary, the primary effects of decommissioning schemes are to speed adjustment of fleet capacity and effort towards a long term equilibrium and to improve the potential profits of the vessels remaining in the fishery. However, the effects of these transfers on fish stocks will generally be negligible unless the decommissioning schemes are implemented in conjunction with management changes to reduce catches or effort if the fishery is initially over-fished.

### *Transfers to labour retirement and retraining*

#### *Description*

Transfers to labour retirement and retraining primarily take the form of payments to fishers to ease the transition out of the industry, either as a lump sum payment to exit the industry or, more usually, as funding for retraining for movement into other occupations. Some governments also provide payments for temporary labour retirement from particular fisheries where there are fluctuations in the fish abundance. Payments for labour retirement and retraining generally arise in response to excess capacity in the fishery. In principle, labour is more mobile than capital in the fishery sector and can more easily be employed in other sectors, although the human capital involved in fishing sector can be highly specific. The transition can be more difficult in regions where fisheries are the dominant industry and alternative occupations are relatively scarce. Regional adjustment schemes that seek to respond to excess capacity or declining fish stocks often include payments to ease the transition of the excess labour.

#### *Points of impact*

The main point of impact for this category of transfers is through incomes and payments are not tied to any output requirements.

#### *Application of the policy filter*

Transfers for labour retirement are generally provided for the same reasons as for the provision of transfers for vessel decommissioning and licence retirement, and often in conjunction with capacity reduction schemes. As a result, the effects of these transfers might be expected to be generally similar to the effects from vessel decommissioning and licence retirement transfers. However, the effects of the transfer will depend on the marginal rate of substitution between labour and capital inputs in the production function of the fishing firm. If, for example, there is a fixed relationship between capital and labour then there will be no opportunities for reductions in effort to flow from labour retirement schemes implemented without accompanying capital retirement schemes.<sup>9</sup> New employees would merely be hired to replace those leaving the industry.

On the other hand, if there are substitution possibilities between labour and capital, then the effects of labour retirement transfers will depend on the elasticity of substitution between labour and capital and on the relative prices of the factor inputs. Experienced labour leaving the industry may have the effect of forcing up wage rates and increasing the use of capital inputs in production (and possibilities for increased effort stuffing). However, the extent to which this will occur is unclear because, unlike transfers to decommissioning where physical scrapping of vessels may be required, it is much more

9. This situation arises in a Leontief or input-output production function where the marginal rate of substitution is zero. See Varian (1978).

difficult to stop fishers re-entering the industry after being paid to retire or retrain if they so desire.

In summary, the net effects of this category of transfers on fish stocks are expected to be zero, irrespective of the management regime in place.

**Table 6.7. Effects of transfers to labour retirement and retraining**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to labour retirement and retraining	Over-fished/under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks

Source: OECD.

### *Transfers to capital costs*

#### *Description*

Transfers to capital costs cover government payments for the construction and modernisation of fishing vessels, loan guarantees, and accelerated depreciation rules for fishing vessels, loan restructuring schemes and tax preferences for investment in and modernisation of fishing vessels. Provision of this type of transfer has been relatively common in many countries over the years and is widely recognised to have contributed to the problems of excess capacity that currently exist in many of the world's fisheries (see, for example, Greboval and Munro 1999; Cunningham and Greboval 2001). While many countries appear to be reducing transfers to the construction of new vessels, transfers to vessel modernisation are still widely provided. Vessel modernisation can cover a wide range of possible activities, including almost completely rebuilding the infrastructure of a vessel, improving landing and on-board processing facilities, installing improved tracking and communication equipment, health and safety improvements and so on. The quantity of total transfers under this category can be difficult to determine; while some transfers are budgeted and, in principle, easily identified, others are classed as "off-budget" transfers (tax exemptions and loan guarantees) and may be harder to quantify.

#### *Points of impact*

Transfers to capital clearly have an impact on both the inputs of the firm in terms of reduced fixed costs (and usually lower operating costs as well due to updated technology) and the risk of capital. Loan guarantees, tax preferences, etc reduce the risks faced by lenders and so loans for vessel construction and modernisation can be made at interest rates that are below market rates.

### *Application of the policy filter*

In the absence of catch or effort controls, transfers to capital costs decrease the cost of investment and lead to more vessels and greater effort being used in the fishery. This will reduce stocks in the long term. The short term effect on catches will depend on whether or not the fishery is initially overfished. If it is overfished, then catches will decline; conversely if the fishery is underfished.

With catch controls, there would be more competition for a given catch but, in principle, there would be no effect on stocks or catches. However, as with other transfers that increase capacity, the excessive capitalisation in the sector that results from the encouragement of the use of capital can place significant pressure on regulatory authorities to relax catch limits (or not to tighten them if the fishery is overfished) to enable the individual boats to earn at least some revenue. The effect on catches and stocks will then depend on the ability of regulators to withstand such pressures.

As effort controls generally prescribe the number of fishing vessels in an industry (among other factors), decreasing the cost of capital should not increase effort or have an impact on stocks. However, this may not necessarily reflect the full picture as transfers to capital lower the cost of boat replacement and increase the rate of boat replacement in the fishery. New vessels are generally able to bring more effective effort to bear on a fishery as they include improvements in technology and power. As has already been noted, it is almost impossible for authorities to regulate all the variables in the effort calculus and so it is highly likely that effort will expand and that fish stocks will be reduced even in the presence of effort controls. The case of transfers to vessel modernisation is slightly different as the expansion of effort takes place through the updating of existing capital to improve capacity and effort, rather than through the creation of additional boats. So while the number of vessels may not increase as a result of the transfer, the effort that is applied can significantly increase.

The existence of individual catch rights is not expected to have an impact on fish stocks as fishing firms have no incentive to increase effort above that necessary to catch their quota. The transfer will, however, alter the relative prices of capital and other inputs (such as labour, fuel, etc) and, in the absence of transfers to these other inputs, will encourage a greater use of capital than would otherwise have been the case. In the longer term, this may create problems of excess capitalisation in the fishery with the attendant problems of capacity shifting and calls for government assistance to reduce the excess. The case of effort rights is similar to the outcomes for effort controls in the absence of property rights.

In summary, the results for the provision of transfers to capital costs are broadly analogous to those for the government provision of infrastructure and management, research and enforcement services. However, there are key differences in the directness of the link between the transfer and the environmental harm and in the transmission mechanism. Transfers to capital costs are generally payments made directly to fishers whereas the transfer element arising out of the free provision of infrastructure arises as a result of the government not charging user fees.<sup>10</sup> The latter arguably represents a much less direct link than a direct payment. The directness of the link is also evident in the way

10. Exceptions to this arise when the subsidies for vessel construction are paid directly to shipyards. In this case, it is the shipyards that are appropriating at least a portion of the subsidy rather than the fishing industry (Hannesson 2003).

that incentives for fishers and the pressures on regulators are more directly affected with transfers to capital.

**Table 6.8. Effects of transfers to capital costs**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to capital costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	Reduced stocks	Reduced stocks

Source: OECD.

### *Transfers to variable costs*

#### *Description*

In addition to subsidising capital costs, some countries also provide transfers to the costs of variable factors of production in the fishing sector. This includes tax exemptions for fuel, the subsidised provision of bait services, government-backed vessel insurance and reinsurance programs and interest deductions for liquidity loans.

#### *Points of impact*

The main point of impact of these transfers is to reduce the costs of inputs.

#### *Applying the policy filter*

The results for transfers to variable costs are broadly similar to those for transfers for capital costs, although the effects will obviously be transmitted through the increased use of variable inputs (fuel, bait, etc) rather than through capital. Transfers to variable costs encourage the excessive use of variable inputs to production and can lead to input stuffing (as opposed to capital stuffing). As has been discussed, this will lead to problems under management using catch controls, effort controls and effort rights as fishers seek to increase effective effort by increasing their use of these other inputs. However, the effect would be through the expansion of effort from the existing fleet rather than through new vessels entering the industry.<sup>11</sup>

It is important to note that transfers to variable inputs which are sourced from the environment (such as fuel and bait) will encourage the excessive use of those inputs as their costs to the fishers do not reflect their true cost. The provision of these transfers could have environmental consequences beyond the impact on targeted fish stocks. This issue in relation to the checklist is discussed further in above.

11. However, to the extent that reduced variable costs reduce the operating costs of new vessels, the replacement of existing vessels could be accelerated.

**Table 6.9. Effects of transfers to variable costs**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to variable costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

### *Income support*

#### *Description*

Transfers to income include direct payments to employees in the fishing industry, direct payments to boat owners, industry specific unemployment insurance schemes, specific tax rules for fishing firms and employees and payments for temporary cessation of fishing (also known as laying-up or tying-up premiums). A range of more general transfers such as regional aid programs, small-scale fisheries aid and development aid can be classed as community support. Providing income support to employees has the effect of reducing the wages that firms need to pay employees to keep them in the industry (in order to prevent them from leaving to higher paying occupations), thereby reducing the costs of fishing operations. Payments direct to boat owners directly increases their incomes.

Unemployment insurance schemes for fishers which are either government funded and underwritten by the government are run by a number of countries. These can take the form of either schemes intended solely for the fishing industry or more generous provision for the sector nested within a more general unemployment insurance scheme.<sup>12</sup> The objective of such payments is usually to help smooth out fluctuations in income that may result from seasonal factors or other environmental perturbations in the fishery. Laying-up premiums work in a similar fashion by providing income for boat owners.

#### *Points of impact*

The main point of impact of these transfers is on income as they serve to ensure that the incomes of fishers do not fall below a minimum level irrespective of market or resource conditions.

12. As is the case in infrastructure expenditure, the extent of subsidisation will depend, at least in part, on whether the fishing industry receives special consideration relative to other sectors.

### *Applying the policy filter*

Income support will have the same effects on fish stocks under the various management regimes as transfers to capital and variable costs. Such support acts in the same way as transfers to capital and variable costs in encouraging the increased use of labour relative to other inputs. The directness of the link will depend on the form of the income support. The more general transfers such as community income support (through regional aid for example) are less direct than income support that is provided directly to individual fishers. Income support in the form of unemployment insurance can also work to inhibit adjustment away from unsustainable levels of fishing in particular fisheries.

**Table 6.10. Effects of income support**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Income support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

### *Direct price support*

#### *Description*

Direct price support to the fishing sector takes two broad forms: price guarantee schemes; and marketing and promotion schemes.<sup>13</sup> Such support schemes are qualitatively different from indirect price support (arising from tariffs and other border measures) in that they operate as direct forms of intervention to maintain market prices rather than as a result of intervention in trade. Price guarantee schemes seek to ensure the industry receives a certain price above the market price either through the payment of a certain amount per kilogram of fish direct to fishers or through the intervention in the market by the government to purchase excess product. Both forms of intervention are designed to maintain a given price of fish, boost the incomes in the sector and reduce the risk of price fluctuations. In some cases, payments may be provided according to the amount of fish produced. The point of impact of these programs is thus also on output as fishers may be faced with an incentive to increase their catches in order to receive higher payments.

13. Recall that market price support provided through tariffs is not addressed in this study.



Programs to market and promote fish products are used in a number of OECD countries. The purpose of these programs is to promote the increased consumption of fish and fish products and are usually introduced to assist the fishing industry to compete with other protein sources (beef, chicken, lamb, etc) for valuable market share.

### *Points of impact*

Price guarantee schemes have an impact on the incomes of the sector and, in some cases, on the output. Marketing and promotion programs serve to both reduce the costs of firms (as they can reduce their own marketing efforts) and to increase incomes (at least indirectly through increased demand for fish products).

### *Applying the policy filter*

Price support subsidies in the form of general price transfers and minimum price schemes raise the incomes of fishers above what they would have been in the absence of the transfer. The effects on stocks for this category of transfers are the same as for transfers in the form of free provision of infrastructure and management, research and enforcement services.

Transfers for marketing and promotion programs have the same effect as transfers for variable costs. However, these programs also serve to increase demand for fish products, so the effects on fish stocks could be exacerbated due to the combined impact of reducing the costs of marketing fish products and increasing the demand for products. The extent of this twofold impact depends on the elasticity of demand for fishery products (this will determine the responsiveness of demand to changes in price).

**Table 6.11. Effects of direct price support**

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Direct price support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

### *Summary*

The effects of transfers on fish stocks for all the transfer categories are summarised in Table 6.12. The common element is the importance of the management regime in determining the effect on fish stocks. The provision of transfers under management regimes involving the combination of catch controls and property rights are unlikely to have any impact on fish stocks. The further the regime is moved away from this

combination on the spectrum of management instruments towards effective open access, the greater the likelihood of transfers incurring some effect on fish stocks.

### **Key issues**

Applying a policy filter to fisheries transfers highlights the key role played by fisheries management regimes in determining the environmental effects of the different types of transfers. However, the important role played by management is not surprising; it follows from the basic models of fisheries economics and has been observed by many analysts (see, for example, OECD 2003a; FAO 2003 to name just a couple of studies). Meanwhile, the preceding analysis raises a number of significant issues which may modify or elaborate the basic results. Consideration of these issues in the application of the policy filter provides a more complete (and more complex) picture of the environmental effects of transfers. Six key issues are addressed in the remainder of this section:

- 1) the effectiveness of management settings, monitoring and enforcement;
- 2) empirical testing of the management parameters;
- 3) the directness of the link between particular transfers and the environment;
- 4) the significance of policy interactions; and
- 5) effects on other environmental variables.

#### ***Effectiveness of management settings, monitoring and enforcement***

The analysis relies on a number of strong assumptions concerning the appropriateness of management settings and the effectiveness of monitoring and enforcement. First, it is assumed that allowable catch and effort levels are set optimally with respect to the long term equilibrium of the fishery. Second, it is assumed that the management regimes are perfectly and effectively monitored and enforced. While these assumptions have facilitated the analysis undertaken to date, relaxation of some or all of these assumptions will increase the complexity of the analysis and may alter some of the conclusions. Relaxation may also assist in better explaining real world behaviour. For example, weak enforcement of catch limits in a fishery with no property rights could mean that the effects of a transfer on the environment are closer to those associated with open access (that is, with no catch or effort controls).

Table 6.12. Summary of the Long-term Effects of Transfers on Fish Stocks

Transfer category	State of fish stock	Management regime					
		Property rights		No property rights			
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls	
Management, research and enforcement expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks	
Infrastructure expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks	
Payments for access to third country waters – subsidising country	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels entering the domestic fishery are more efficient	
Payments for access to third country waters – host country	Over-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Reduced stocks if TAC increases	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with reduced catches in the short term	Reduced stocks	
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Catches may increase if TAC increased	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with increased catches in the short term	Reduced stocks	

Table 6.12. (cont.) Summary of the Long-term Effects of Transfers on Fish Stocks

Transfer category	State of fish stock	Management regime						
		Property rights			No property rights			
		Catch controls	Effort controls	Catch controls	Effort controls	Catch controls	No catch or effort controls	
Transfers to de-commissioning and licence retirement	Over-fished	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks	Effort reduced,	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks if new vessels more efficient
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks if new vessels more efficient
Transfers to labour retirement and retraining	Over-fished/under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks
	Over-fished/under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	Reduced stocks	Reduced stocks
Transfers to variable costs	Over-fished/under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
	Over-fished/under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Income support	Over-fished/under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
	Over-fished/under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

On a related point, the political economy of transfers means that the effects of transfers are likely to be less clear cut than the stylised analysis suggests. As with most of the other literature on fisheries transfers, the analysis in this paper necessarily abstracts from key political economy aspects of the real world of transfers and fisheries. These aspects relate, among other things, to the power of interest groups to influence the outcomes of policy decisions and can be potentially significant for determining the outcomes of transfer provision, both on the environment as well as on economic and social outcomes. For example, under a catch control regime, the provision of transfers may encourage lobbying for larger TACs (Hannesson 2001, p. 28). They may also make monitoring and compliance more difficult, partly because industry has less of a stake in the health of the fish stocks and partly because the increasing participation in the industry will make it more difficult to monitor the total catch and ensure compliance of individual vessels. While this may also happen under systems with property rights, it is less likely to occur as the market value of quotas or fishing licenses depends on the long-term health of the stocks. In another example, the continued provision of transfers for income support in a particular fishery may occur for largely political reasons even though the management of the fishery is not sufficiently well-designed or enforced to ensure the sustainability of the fish stocks. In such a case, political priorities, together with poor management, may represent one of the key obstacles to the reform of environmentally harmful transfers.

### *Empirical testing of the management parameters*

The stylised management parameters, while highly simplified, are readily recognised as reflecting the key features of management regimes in the real world. In terms of environmental impacts, it is clear that the issue is not so much whether a country provides a transfer to a fishery, but rather what management parameters govern the fishery in which the transfer is provided. While this is largely an empirical question that is beyond the scope of this paper, previous OECD studies have shed some light on this empirical question.

OECD (1997) provided a thorough review of the management regimes in place in OECD countries in the early to mid 1990s. The inventory of management focused on the type and extent of input controls, output controls, technical measures and property rights. In OECD (2003a), it was concluded that most OECD countries fall between the catch control and effective management regimes, using the categorisation of regimes devised by Hannesson (2001).<sup>14</sup> While there has been a gradual shift in many OECD countries from catch control towards effective management, as more and more restrictions are placed on entering particular fisheries, most countries remain closer to catch control than effective management. The report noted that this observation may moderate the view that there are few impacts of government financial transfers on marine fish stocks in OECD countries. In analysing fisheries management costs, OECD (2003b) classified OECD countries into three broad groups according to whether the countries' management was based on predominantly output controls, predominantly input controls or a mixture of input and output controls. The study found that most of the OECD countries fell into the mixed input and output controls, with relatively few in the category of predominantly output controls (Table 6.4).

While these studies provide an introduction to the types of management regimes in place in OECD countries, they fall short of the depth of analysis required to properly

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14. Recall the three stylised management regimes discussed briefly in section 4.1.

assess the effectiveness of particular management regimes in terms of the checklist. It is clear that the evaluation of transfers within the checklist framework, a much more detailed assessment of management regimes is required. Such assessment would necessarily include an evaluation of the effectiveness and strength of management (including management settings, monitoring and enforcement as discussed above) and the governance/institutional settings within which management takes place.

### *Significance of policy interactions*

The analysis assumes that the transfers are applied to the fishery in the absence of other policy interventions (except, of course, for management policies). However, this is rarely the case in the real world and governments generally apply a range of policies, including transfers, to the sector in order to meet a range of policy goals. Consider the case where several different types of transfers are applied to a given fishery. The concurrent application may either magnify or offset the environmental effects of each of the transfers. For example, the provision of transfers to both capital and variable costs will be reinforcing the environmental effects by lowering the costs of fishing more than would have otherwise have been the case with just one of the transfers. An example of offsetting transfers arises where countries provide transfers for both vessel decommissioning and vessel construction, as has been observed in a number of OECD countries.

The interaction between transfer policies and other government policies (for example, relating to tax policy or broader environmental policy) can be similarly reinforcing or offsetting with respect to the impacts on the environment. For example, many governments are providing transfers to fuel use in the form of tax exemptions while at the same time enacting legislation aimed at energy conservation or mitigation of climate change.

### *Effects on other environmental variables*

The analysis has, of necessity at this stage, focused on the effects of transfers on fish stocks. No account is taken of the broader range of environmental variables that are of analytical and policy interest. These include, for example, the effects of transfers on by-catch, the marine benthos, marine pollution and the fuel used in fishing operations. Transfers to particular types of gear use or to fuel use will have environmental effects beyond the target fish stock and need to be taken into account in the checklist.

The analysis also assumed that the fisheries were single species fisheries, rather than multispecies fisheries. Dropping this assumption increases the complexity of the analysis, a point noted in many studies on multispecies fisheries (OECD 1997, p. 113; Clark 1990, pp. 310-342). In multispecies fisheries, operators harvest a range of fish species using a variety of gears and often in different geographical locations. There are also often a variety of management instruments applied to the different species within a particular fishery. Fishers are likely to have greater scope for shifting operations, costs and revenues between species to maximise profits. As a result, it is harder to trace and isolate the effects of transfers on fish stocks.

## **Concluding remarks**

In summary, the checklist is a useful screening methodology when undertaking a review of particular transfer policies in the fisheries sector. It is clear that the first step in

the checklist, the policy filter, is the key to the analysis: the other steps of the checklist appear to be of less immediate policy concern (although they may be significant in individual cases). By passing transfer programs through the policy filter, the environmental effects can be readily identified under alternative management parameters. While the analysis in this paper is relatively stylistic, it has shed light on the relationships between the provision of different types of transfers and environmental outcomes. Empirical application of the checklist to real world fisheries is one of the necessary next steps in this process. The use of case studies would be an appropriate means to this end.

So, with respect to environmental outcomes, the relevant observation should focus on how well particular fisheries are managed rather than purely on whether transfers are provided. Certainly, the analysis in this paper reinforces the conclusion from the bulk of the fisheries management literature that, in principle at least, the management combination of property rights and catch controls provides the most effective regime for ensuring the environmental sustainability of fish stocks. Equally important though is the effectiveness of the policy setting and monitoring and enforcement. Inappropriate management settings or ineffective enforcement can radically alter the expected effects of subsidies and exacerbate environmental harm. This raises a myriad of issues relating to governance, institutional arrangements and political economy (lobbying, rent-seeking, and so on). Such issues are the key areas for future research to better understand how they fit into the checklist and how they form obstacles to the sustainable management of fisheries.



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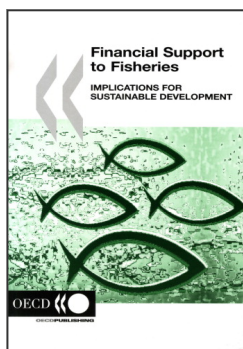
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