

MEASURING ASSISTANCE TO THE FISHING INDUSTRY: SOME CONCEPTUAL ISSUES

(Submitted by the Australian authorities)

Introduction

Industry assistance imposes costs on an economy by protecting domestic industry from competitive market forces. The efficient allocation of resources between domestic industries is distorted, as is the pattern of international trade. The measurement of assistance provides the information necessary to enable governments to improve resource allocation and effectively negotiate to reduce trade barriers under the General Agreement on Tariffs and Trade (GATT).

The procedures developed to quantify assistance to the agricultural sector are not entirely appropriate for the fishing industry. This is because fisheries differ from agricultural industries in two important respects. The existence of widespread market failure in fisheries due to a lack of private property rights over fish resources, and the fact that most established fisheries are fully exploited and incapable of providing increased long run supplies of fish, are characteristics which contrast with agriculture and which must be taken into account when measuring assistance to the fishing industry.

The purpose in this paper is threefold; to clarify some of the conceptual issues relating to the measurement of assistance to the fishing industry, to propose a framework for measurement and to provide some estimates of the assistance afforded to several major Australian fisheries.

Some conceptual issues in the measurement of assistance

Unlike many other industries, it cannot be assumed that all government intervention in fisheries is directed toward providing industry assistance. The existence of widespread market failure (due to "open access" to fish resources) which results in the biological and economic overexploitation of many fisheries, provides an economic rationale for government to intervene to rectify this problem (that is, unless the costs of intervention outweigh the benefits of a more efficient industry). Such interventions to correct existing market failures are economically desirable and must be differentiated from assistance interventions designed to support the incomes of participants in the domestic industry.

A benchmark for assistance measurement

A paper presented to the 64th meeting of the Committee for Fisheries of the OECD by the Australian Government (ABARE, 1989) suggested a benchmark against which assistance to the fishing industry could be measured and provided some guidance as to which interventions could be classified as assistance. The benchmark proposed was unassisted free trade prices for valuing inputs and outputs, and a resource management regime which overcomes the above "open access" market failure and maximises the economic yield from the fishery.

The long run, steady state concepts of maximum economic yield (MEY) maximum sustainable yield (MSY) and open access equilibrium are illustrated in Figure 1. Total sustainable revenues and total costs for a fishery, based on unassisted prices for inputs and outputs, are shown as functions of fishing effort. Under open access, fishermen enter the fishery until all potential profits above a normal return on capital are dissipated, and total fishing costs (including opportunity costs of labour and capital) equal total revenue, at point "O". The maximum economic yield is achieved at point "A" where the difference between revenues and costs is greatest and hence where fishery profits are maximised.

Figure 1

Although assistance measures to fisheries are likely to have long term distortionary effects on resource allocation and perhaps on trade, their effectiveness in raising fishermen's incomes is likely to be short lived in the absence of economic fisheries management based on the assignment to fishermen of well defined property rights over fish stocks, such as in the form of individual transferable quotas (ITQs). Without adequate individual property rights (for example, where access to the resource is subject to licence, but shares of the total catch are not assigned to individual fishermen) fishermen increase their fishing effort whenever the profitability of fishing increases, such as may occur following the introduction of an assistance measure which increases market prices for fish or reduces fishing costs. These increases in fishing effort raise industry costs, dissipating the gains from assistance. The future sustainable yield of the fish stock may also be reduced under the assisted open access conditions, imposing long run costs on the industry.

The effects on a fishery (under non-economic management) of assistance measures which lower fishing costs or raise industry revenue, are illustrated in Figures 2 and 3 respectively. In Figure 2 a cost reducing assistance measure results in short run profits of "OD" being earned in the fishery. These higher-than-normal profits encourage entry to the industry and existing fishermen to increase their fishing effort. Fishing effort and total cost increase until all the above-normal profits are dissipated, at point F, the assisted open access equilibrium position.

Figure 2

Figure 3

The assisted increase in fishing revenues shown in Figure 3 also encourages fishing effort to increase, to the new assisted open access point "G" where all the benefits from the assistance are dissipated.

Without well defined property rights to the resource existing fishermen will thus gain few, if any, long term benefits from the introduction of assistance measures. The amount committed to the assistance measures will become a dead weight loss to tax payers, and there will be efficiency losses due to the misallocation of resources between industries. The only groups that stand to benefit from assistance under these circumstances are new, high cost entrants to the industry who in the absence of assistance would not be able to operate economically, and the suppliers of fishing inputs who achieve increased sales.

The fishing industry will fail to make any worthwhile contribution to the national economy until effective fishery management reduces fishing effort to below the level which would prevail under open access. Reductions in industry assistance in fisheries in which property rights are not well established will merely allow the industry, by reducing fishing effort, to return to the open access conditions which existed prior to the introduction of the assistance measure. In the case of an overexploited fishery, the removal of assistance and the subsequent reduction in fishing effort may result in an increase in long term sustainable catch (from point "F" to "O" in Figure 2).

Government intervention: assistance or fishery management?

Because of a scarcity of biological and economic data, the economically optimal levels of catch and fishing effort are highly uncertain for most fisheries, although the desirable direction of change is usually obvious. For the measurement of industry assistance a knowledge of the desirable direction of change is generally all that is required to distinguish fisheries management from assistance interventions. Government interventions which move the fishery toward a long run economically efficient condition are management regimes, not assistance measures.

However, some resource management measures may be ambiguous in their purpose and effects. For example, if a total allowable catch (TAC) is set to allow the maximum sustainable yield from the fish stock rather than the maximum economic yield, this could be construed as industry assistance since it allows the industry to be larger than the economic optimum. In practice, however, given the uncertainties inherent in bioeconomic assessments and the annual fluctuations in stock size, fishery managers often have little choice but to accept the sustainable yield estimates given by biologists and then attempt to maximise the efficiency of the industry at that yield.

If attempts to improve industry efficiency by reducing the level of fishing effort required to take the total allowable catch are ineffective, or if open access market failure is perpetuated by government failing to introduce any form of management, then the industry could be said to be assisted. That is, if government does not take an economic approach to the management of fish resources, the industry will grow beyond its economically optimal size and would therefore be assisted relative to the "no assistance" benchmark defined above.

However, this form of "assistance" differs radically from the traditional interpretation of assistance as it does not advantage anybody in the fishery. In fact, it is more akin to a tax on the fishery than a subsidy, since it has the effect of reducing fishermen's incomes relative to their potential earnings under a more effective management regime. This can be seen from Figure 1 in which fishery costs have been increased relative to the benchmark situation by an amount "CO" as a result of inadequate or no management. The corresponding total potential gain, or "efficiency dividend", from the introduction of effective management is given by the distance "AB".

As it is a lack of, or ineffective, government intervention which is responsible for the potential availability of this efficiency dividend, the usual methods for quantifying the benefits to the industry are inappropriate. Quantification requires the development of a bioeconomic model for each fishery. The efficiency dividend could then be estimated as the potential increase in industry profitability from moving from the current to the economically optimal position. The likelihood of such fishery models being developed for this purpose for a wide range of fisheries seems remote, at least in the short term, though, technically, it would be feasible to construct such models.

As the effect of industry "assistance" in the form of ineffective management is primarily to retard the economic performance of the domestic industry, the most important implication from such a finding related to the need for government to critically review its approach to fisheries management.

Attempts to measure the impact on international trade of the resulting suboptimality in levels of fish production, and associated debate on whether national TACs reflect maximum sustainable yields, maximum economic yields or other objectives, are likely to be extremely unproductive given the information deficiencies in this regard. The goal of improved efficiency in international trade may be better served by focusing on those types of assistance measures which have a more identifiable effect on trade.

Foreign fishing and domestic assistance

A refinement to the "no assistance" benchmark outlined earlier has been suggested in a paper prepared by the European Community for the 65th meeting of the Committee for Fisheries of the OECD (Commission of the European Community, 1990). The Commission correctly suggests that, to fully correct for the existing market failure in fish harvesting, fishing rights should be internationally tradable so that the most efficient operators, whatever their nationality, are able to purchase those rights at a market determined price.

However, international trade in fishing rights would improve overall economic efficiency only if there was no disparity in the levels of industry assistance between the trading partners. If the fishing industry of one country enjoys a higher degree of government assistance than the industries of other countries, then the price for fishing rights that the highly assisted industry would be willing to pay could exceed that of more efficient, but lightly assisted, industries. Trade under these circumstances would reduce the efficiency with which the fish resource is harvested. Equating the levels of assistance between countries, or removing assistance entirely, should therefore be a prerequisite to the commencement of international trade of fishing rights.

The Commission (1990) suggests that existing restrictions on the traditional free access of foreign fleets to domestic fishing grounds constitute assistance to the domestic industry. If the traditional activities of foreign fleets are restricted in order to allow the domestic fleet to expand, then this is indeed assistance. On the other hand, the access restriction may be a part of a management programme to reduce fishing effort and catches toward the maximum economic yield.

It should be noted in this regard that the introduction of 200 mile exclusive economic zones under the provisions of the United Nations Convention on the Law of the Sea, and the subsequent restrictions placed on foreign fishing by coastal states, were in response to the need to reduce the open access overexploitation of fish resources. Seen in this light the introduction of exclusive fishing zones was a first step in the process of defining property rights over the fish stocks, and as such constituted an important step towards economic efficiency in fish production.

Categorising assistance measures

Turning now to the trade in fisheries products, it is clear that many assistance measures which, for example, lower fishing costs and increase fishing effort will have little or no effect on the prices or quantities of fish supplied, and therefore no significant effect on international trade. This is because there is little scope to increase the catches from most established fisheries, which tend to be already fully or

overexploited. This is in contrast to the increase in output which similar assistance measures would engender in other industries such as agriculture.

Only the measures which provide assistance to the outputs of the fishing industry, such as tariffs, import quotas, price support schemes, and the like, will have a significant distortionary impact on international trade. While it may be useful from a domestic resource allocation perspective to estimate the assistance afforded by assistance measures such as fuel subsidies and tax concessions, it will be of little value in relation to the goal of improving the efficiency of international trade in fisheries products. In fact, by lumping together the producer subsidies implied by those measures which affect international trade with those which do not, the value of the resulting measure in relation to the examination of trade issues is undermined. For example, a large subsidy equivalent may be taken to imply the existence of substantial trade barriers when it may actually reflect the existence of a subsidy on fishing input in a fully exploited fishery; a measure which would have only a marginal effect on trade.

For this reason two distinct measures of assistance for the fishing industry of each country should be estimated, one related to trade-distorting measures and one for non-trade-distorting assistance measures. The latter could be used as a partial measure of the domestic misallocation of resources between industries. It is partial in the sense that it provides an indicator of the extent to which resources may be attracted to the fishing industry in excess of those which would be employed under otherwise unassisted open access conditions.

A possible third measure of industry "assistance" would be the efficiency dividend which reflects the gains from correcting the misallocation of resources, in the form of excessive labour and capital employed in the fishery, under open access or ineffective management.

Addition of the trade-distorting and non-trade-distorting subsidy equivalents would be necessary to allow a valid comparison of national assistance measures when considering the potential international trade in fishing rights. Since assistance in the form of inefficient management does not provide any competitive advantage to domestic operators, it is irrelevant to the comparison of national assistance levels in this context.

The economic environment in Australia

In recent years the Australian government has developed a broad economic strategy directed toward maximising the efficiency and competitiveness of Australian industries.

As a part of this strategy the government is reducing tariff protection and other regulatory impediments to trade. In 1988, a comprehensive programme of phased tariff reductions to the manufacturing and rural sectors was instituted. This programme is expected to result in an average 30 per cent reduction in the tariffs protecting these industries by mid-1992.

As a part of this general thrust toward improving the competitiveness of the economy the Australian government has employed a policy of "microeconomic reform" to increase industry efficiency through restructuring and, in some cases, the introduction of increased competition.

Reforms are, for example, being planned for the dockyards and for land and sea transport, where inefficiencies are proving to be significant impediments to the efficient operations of export-oriented industries, such as the fishing industry. The increasingly economic approach to fisheries management in Australia is also a reflection of the process of microeconomic reform.

Direction of fisheries management

The release, in December 1989, of the Australian Government's policy statement on fisheries was an important step in defining future management directions. The objectives of management outlined in the statement are:

- economic efficiency;
- biological sustainability; and
- provisions of a payment by the users (fishermen) to the owners of the resource (the entire Australian community).

At present most Australian fisheries are characterised by management policies based on restricting the use of various fishing inputs. Despite management controls, fishing effort has often risen to levels far in excess of those necessary to harvest the resource in an economically efficient way. As a result, most fish stocks are fully or overexploited and the average profitability of the fishing industries is low.

There is a clear need to restructure the fleets of important Australian fisheries, such as the northern prawn, south-east trawl and southern shark. The Australian Fisheries Service is currently reviewing the management of these fisheries, particularly in order to meet the previously stated management objectives.

The policy directions recommended in the Australian Government's policy statement will provide the stimulus for a more consistent, efficiency oriented approach to fisheries management. The advantages of individual transferable quotas (ITQs) in this regard have been strongly endorsed. This is in recognition of the fact that ITQs encourage fishermen to operate in a more efficient manner by reducing fishing costs and improving their marketing efforts. By promoting economic efficiency the Australian Government will help the fishing industry to remain a competitive and profitable supplier to world markets.

Assistance to the Australian fishing industry

To illustrate the types and extent of assistance provided to the fishing industry, an analysis of assistance to three major Commonwealth managed fisheries has been carried out. The fisheries are the northern prawn, south-east-trawl and southern bluefin tuna fisheries, which together accounted for almost 30 per cent of the gross value of Australian fisheries production in 1988-89. The assistance provided to these industries by a range of interventions is detailed in Table 1.

Three different categories of assistance are identified: trade distorting, non-trade-distorting and the management-related efficiency dividend. Summary estimates of the net subsidy equivalents provided by trade-distorting and non-trade-distorting assistance measures and the efficiency dividends from more effective fishery management are given in Table 2.

Table 1. Examples of assistance calculations for three Australian fisheries (1989-1990)
(A\$ '000)

Item	NPF	SBT	SET
Value of output	104 000	36 000	66 000
<u>Less inputs</u>			
Fuel less rebate	17 221	1 754	4 668
Repairs and maintenance	29 712	2 235	8 727
Services	19 177	11 078	19 845
Depreciation	21 236	2 292	4 288
Other			
Total inputs	99 933	18 856	44 675
Value added	4 067	17 144	21 325
<u>Plus Assistance to value adding factors</u>			
Income tax: Averaging concessions	537	185	333
Technical research	90	90	28
Total assistance to value added	627	213	424
Assisted value added (AVA)	4 694	17 357	21 748
<u>Less Assistance to outputs</u>			
Tariffs on canned tuna	0	46	0
Export incentives	193	0	126
Export inspection services	83	4	171
Promotion and marketing research	76	0	20
Total Assistance to outputs	352	51	316
<u>Less assistance to value adding factors</u>	627	213	424
Unassisted value added (UVA)	3 715	17 093	21 009

1. NPF = Northern Prawn Fishery.
2. SBT = Southern Bluefin Tuna Fishery.
3. SET = South-east Trawl Fishery.

Table 2. Subsidy equivalents and efficiency dividends (1989-1990)
(A\$ million)

Assistance category	NPF	SBT	SET
Trade-distorting	0.35	0.05	0.32
Non-trade-distorting	0.63	0.21	0.42
Total non-management assistance	0.98	0.26	0.74
as a percentage of unassisted value added	26.4%	1.5%	3.5%
Efficiency dividend	17	0	15

Trade distorting assistance

Trade-distorting interventions affecting the Australian fishing industry are relatively few and afford little assistance to the industry. Border measures, export incentives, export inspection services and subsidised marketing costs all fall into the "assistance to outputs" and thus "trade distorting" category. Budgetary outlets by the government are taken to represent the support provided by these measures except in the case of tariffs, the effects of which are estimated using an empirical approach.

The only border measure in force is an {ad valorem} tariff levied on imports of prepared tuna. The level of the tariff is relatively low, 13 per cent, and will fall to 10 per cent by 1992 as the programme of phased tariff reductions in rural industries takes effect.

The procedure used to measure the assistance provided by this tariff is that described in the paper submitted by the US Government to the 64th meeting of the Committee for Fisheries (Bellows, 1988). That is, the duty collected from the tariff is used as the basis for estimating the support provided to the domestic industry. As the tariff is applied to processed (canned) tuna, a conversion factor must be used to estimate the rate of tariff protection in live weight-equivalent terms to allow the effect of the tariff on the Australian tuna catching sector to be estimated.

In 1989-90, 6 998 tons of canned tuna, equivalent to approximately 16 655 tons of live weight tuna, was imported into Australia. The duty collected amounted to A\$ 2 807 480, or A\$ 169/ton of tuna (live weight). This rate of duty is assumed to be the difference between the Australian and world prices for canning tuna, and represents the support to the domestic industry per ton of tuna supplied for canning.

Southern bluefin is the only Australian-caught tuna species used for canning purposes. The proportion of the catch sent to canneries has fallen markedly in recent years as operators have diverted product to the more highly priced Japanese sashimi market. In 1989-90, only around 275 tons of Australian southern bluefin tuna were canned, less than 5 per cent of the total catch.

Export incentives constitute another form of assistance to the fishing industry, and take the form of a number of market development programmes. These are the "export market development grants scheme", the "innovative agricultural marketing programme" and the "primary industries marketing skills programme". Use of these schemes by the fishing industry has been modest.

Export inspection services provided by the government ensure that exports of fisheries products satisfy health, hygiene and conformity to labelling standards. The enforcement of industry standards promotes buyer confidence in the Australian product, and may as a result affect prices received. Some 60 per cent of the costs of export inspection services are recovered from the fishing industry.

Assistance to fish marketing activities is another avenue of support for the industry. Government funded fish promotion campaigns and marketing research fall into this category. Again, the assistance provided to fish marketing is slight, with the industry funding most of the activities.

The subsidy equivalent of the trade-distorting measures described above, in relation to the three fisheries under consideration, is A\$0.72 million.

Non-trade-distorting assistance

Non-trade-distorting assistance measures in fisheries include all those interventions which could be classified as assistance to inputs of assistance to value adding factors. In Australia, there are only two measures which fall into this category: income tax averaging and technical fisheries research.

The facility of income tax averaging, provided to all primary producers, allows an average of the current and previous four years' incomes to be used as the basis for determining the rate of tax to be applied to the current year's taxable income. The purpose of the averaging provisions is to compensate for the period inequity which arises when tax payers with fluctuating incomes pays more tax over a period of time than other tax payers with the same average, but more stable, taxable income. However, if fishermen's incomes are trending upwards then the averaging provisions may result in fishermen paying less tax than individuals with the same average, but stable, income streams. It is this component of the benefits of tax averaging which constitutes industry assistance.

Much of the fisheries research undertaken in Australia is conducted by government agencies. The Australian Bureau of Agricultural and Resource Economic carries out most of the economics and management research while the Commonwealth Scientific and Research Organisation conducts the majority of biological studies. This research is predominantly government funded. However, almost all of the economic and biological research is necessary for the efficient management of fisheries, and is not therefore industry assistance. Only technical research on matters such as the effectiveness of various net designs, and research related to fish marketing, readily qualify as assistance. The extent of such research in Australia is very limited.

The subsidy equivalent of the non-trade-distorting assistance measures for 1989-90 is A\$1.26 million. It should be noted that no allowance has been made here for the negative assistance or tax levied on fishermen resulting from the protection afforded to the suppliers of various fishing inputs.

Management related efficiency dividends

In each of the Commonwealth fisheries under consideration the government has in place various policies directed at reducing fishing effort and moving the fisheries toward a more economically efficient plane of operation. These regulations have had varying degrees of success.

Management of the northern prawn fishery is based on limited entry and the use of additional input controls. Despite a licence buy-back programme having removed about 20 per cent of the fleet over the past four years a recent bioeconomic study of the fishery indicated that the fleet is still twice as large as that necessary to take the catch efficiently (Pascoe and Scott, 1989), and that fishery profits could be increased by more than A\$17 million a year. The need to further reduce the size of the northern prawn fleet has been accepted by both government and industry, and ways of achieving this goal are currently under consideration.

In both the northern prawn and south-east trawl fisheries boat replacement policies aim to reduce the fishing capacity of the fleets. By forcing operators, whose boats are measured in terms of units of fishing capacity, to forfeit a proportion of their units every time they upgrade or modify their boat, the total fleet capacity should be gradually reduced over time. ITQs were also introduced in 1988 on one key species in the south-east trawl fishery. A recent study of the management of this fishery (Geen, Brown and Pascoe, 1990) suggested that long term fishery profitability could be increased by around A\$15 million a year by replacing the predominantly input based management by a system of ITQs on all

major species. The Australian Fisheries Service is currently in the process of implementing a widespread ITQ programme in the fishery.

The value added estimate provided for the south-east trawl fishery in Table 1 reflects the rapid and highly profitable development in 1989 of a deep water fishery for orange roughy, rather than the long run earning potential of the fishery under the input based management regime. Because the management system is unable to prevent fishing effort, and thus industry costs, from increasing in response to the increased profitability of the fishery, long run industry profits will be lower than the profits earned in 1989-90. A total allowable catch some 30 per cent lower than the catch taken in 1989-90 is already in force to protect the stock from overfishing.

ITQs were introduced into the Australian southern bluefin tuna fishery in 1984 and led to a rapid restructuring of the industry. Although the fishery is operating efficiently at the current quota level the size of the tuna stock and the allowable catch are far below their economic optimums. Overfishing by the Japanese and Australian fleets in the 1970s and early 1980s will take many years to remedy despite the global southern bluefin tuna quota being cut by two-thirds since 1985. An important advantage of ITQs is that they provide a mechanism for the industry to adjust to changes in quota levels and by so doing enable the industry to continue to operate efficiently.

Concluding comments

This paper has sought to clarify some of the key issues in relation to the measurement of assistance to the fishing industry. An important point is that because most established fisheries are fully or overexploited the scope for assistance measures to encourage increased production is very limited, in contrast to their effects on other industries. The suggested division of "traditional" assistance measures into trade-distorting and non-trade-distorting is in recognition of this peculiar characteristic of the fishing industry.

Ineffective fishery management, or indeed a lack of fishery management, which leads to the industry growing larger than would be economically desirable might be viewed as providing a form of industry assistance. As this form of assistance provides no support to the incomes of fishermen, reduces the efficiency of the domestic economy and has little effect on international trade, the main benefit from quantification would be to provide the government with an indication of the potential gains, or efficiency dividend, from adopting more effective fisheries management practices.

A desirable by-product of the measurement of assistance to the fishing industry may well be an increased international awareness of the potential benefits from a more economic approach to fisheries management.

The potential improvement in economic efficiency in fish harvesting from allowing international trade in fishing rights was also considered. The critical point here is that efficiency will be promoted only if there is no disparity between the levels of industry assistance provided to the industries of the potential trading partners. Equating assistance levels should therefore be an important prerequisite to international trade in fishing rights.

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