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Development of the Canadian East Coast Offshore Fisheries

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Abstract

This paper discusses various development strategies for the Canadian East Coast offshore (ECO) fisheries. It concludes that the strategies recommended in the literature (independent development, earmarked licenses, direct foreign investment, or international joint ventures) are inappropriate in the ECO case. Four alternative strategies (the current federal policy, quota reductions coupled with domestic incentives, third market trade, and graduated licenses) are outlined. Using a simple model which treats the foreign fleet as a multiplant monopoly, benefits and costs to the Canadian economy of tying licenses to harvesting or offshore processing are compared.

The paper concludes that the optimal development strategy is one which would allow foreign fleets continued access to ECO fisheries. In return, Canada would levy high graduated licenses on harvested fish and receive preferential access to foreign markets via reduced tariffs and extra quota allocations. This strategy should yield substantial benefits both to Canada and to ECO industry at low cost. A policy of increasing the Canadian relative to the foreign share of fishing effort, on the other hand, would not be in Canada's best short run or long run interests except under the most optimistic assumptions.

I. Introduction

There is at present a controversy among Canadian government officials, economists and industry groups concerning the development of the East Coast offshore (ECO) fisheries. Since 1977 when the federal government declared the Exclusive Economic Zone (EEZ), Canadian harvesting has been generally restricted to traditional fish from traditional areas (TT) and Canadian processing to plants onshore. Foreign fleets have been licensed and allocated binding quotas to fish traditional fish from non-traditional areas (TN) and non-traditional fish (N) which are processed at sea, and in return for which Canada often receives preferential access to their domestic markets. The ECO fishing industry is pressing for access to fish stocks in Canada's waters now restricted to the foreign fleets in order to raise the domestic share at the expense of foreign fishing effort. Canadian economists (Copes [1978], Tomlinson and Vertinsky [1975], Tomlinson and

Brown [1979]) have also recommended larger Canadian participation, specifically through the strategy of the international joint venture (IJV) with the foreign fleets. The federal government, however, refuses in general to license Canadian firms to harvest and process the TN and N categories.

The purpose of this paper is to determine whether further development of the ECO fisheries is practical, and if so, what are the feasible methods. We review the various strategies in the literature for fisheries development, and discuss the application of these to the ECO industry. Alternative methods to increase Canadian relative to foreign harvesting and processing are examined using a simple model of the foreign fishing fleet. Finally, the benefits and cost to Canada of increased Canadian access (as recommended by the industry and in the literature) are compared to those generated by current federal policy.

The paper concludes that the policy literature on fisheries development is basically inappropriate for the ECO fisheries. The implicit assumptions in this literature: (1) domestic capacity in harvesting and processing should be expanded; (2) the foreign fleet will sell its catch to the licensing nation; and (3) the licensor's economy can absorb the extra fish; do not apply in the ECO case. Canadian production already exceeds domestic demand; and foreign fleets fish for their own markets. Also any attempt to raise the Canadian share and export the increased surplus would meet with foreign resistance and possible removal of preferential access to these markets. We therefore conclude that the strategies outlined in the literature are not feasible as "development" tools per se for the ECO fisheries. We then suggest alternative strategies to increase the Canadian share of fish harvested and/or processed. Assuming the federal government does decide to expand the Canadian share, we show that feasible methods are graduated licenses tied to either the volume of fish harvested and/or to that processed offshore by the foreign fleets. These licenses could be supplemented by specific quota regulations and subsidies to domestic onshore processing.

Lastly, we conclude that it is not in Canada's best short run interests to increase the Canadian relative to the foreign share of fishing effort. The current federal policy of restricting Canadian effort to the TT category and trading off foreign effort in the TN and N categories for license fees and preferential market access can yield substantial benefits to the Canadian economy at low cost. Raising the Canadian share would be expensive and risk retaliation from the foreign nations. Similarly a gradual replacement strategy would be efficient in the long run only under the most optimistic assumptions.

II. The East Coast Offshore Fisheries

Canada is one of the world's largest exporters of fish, specializing in harvesting species with relatively high values in both domestic and foreign markets. The fishing industry is an important part of the export sector for Canada; more than two-thirds of the total catch is surplus to domestic consumption, and the United States is the major market (Department of External Affairs [1977, 76]). The ECO sector, both by volumes harvested and landed values, is more important than the inshore sector or the Pacific coast fishery.

The offshore fish now available to Canada within the EEZ may be divided into three categories:

(i) traditional species taken from traditional areas (TT)

(ii) traditional, or underutilized species from non-traditional areas, generally in the north (TN)

(iii) non-traditional, or unutilized species (N)

The Canadian government constrains the domestic fleet through its licensing policy to full participation in the first category and segments of the second, leaving foreign fleets to harvest the far northern fisheries and the third category. The dual activity continues because, firstly, foreign effort is traded off for Canadian access to foreign markets through tariff reductions or increased quotas; secondly, the government refuses to license vessels on the grounds that part of the TN fishery is not viable due to high capital and transport costs; and thirdly, the government wants to restrict the domestic fleet to fish that are high valued in the domestic market, while leaving the low valued N category for the foreign fleets. This policy is expected to continue through the 1980s (Department of Fisheries and Oceans [DFO] [1981b, 4 5]).

The ECO industry is a vertically integrated oligopoly that harvests, processes and markets basically TT fish. In 1976 twelve integrated multi-plant firms accounted for eighty percent of the output of free and frozen groundfish, and forty-five percent of total fishery production in the Atlantic provinces. These twelve firms owned fifty processing plants, half of which were comparatively small in scale. There were 250 other small processing plants, owned by more than 100 other companies, processing the output of both the inshore and offshore sectors. The twenty-five large plants had an annual capacity utilization ratio of sixty-five percent, while the average for the smaller plants was forty-five percent, suggesting high average costs for all plants (Department of the Environment [DOE] [1976, 27]). The large firms in 1973 owned approximately 250 vessels of 100 feet or more in length which harvested half the regional catch, although they made up less than one percent of the fleet (DOE [1976, 25]). The domestic building of vessels is subsidized by the federal government, and new processing plants are encouraged with incentive grants and soft loans, mostly from provincial governments (Canadian Tax Foundation, <u>Annual</u>

Reports).

The primary ECO export market is the United States which now absorbs fifty percent of all groundfish exports. In absolute dollar terms, Canadian fish exports to the U.S. have tripled since 1970, but in relative terms the Canadian share of the U.S. market has fallen from seventy to fifty percent (DFO [1981c, 66]). This has come about because (1) industry fears of heavy dependence on one market have led to increasingly successful penetration of the European Economic Community; (2) Canadian exporters now compete in the U.S. market against centralized European marketing agencies; and (3) Canadian fish have gained a reputation for inferior quality compared to European fish (DOE [1976, 40-3]).

The foreign activity consists of distant-water fishing fleets, owned by both state and private enterprise, which are composed of large ships designed for cold areas. There are freezer trawlers that harvest and freeze the catch, and factory freezer ships that collect and process the output of smaller vessels. Both kinds enter Canadian ports for provisions, repairs and rest and recreation. The output of these vessels is destined for own consumption and/or export by the foreign nations. None of the fish is processed onshore in Canada or sold directly to Canadian markets. Before the declaration of the EEZ, the Canadian government did not levy license fees on these fleets, nor did it set quota allocations. In 1978, access and daily fishing fees based on gross registered tonnage (GRT) were instituted for the first time. The annual access fee ($1.10 per GRT) and the daily fee for the codfishery ($0.198 per GRT per day) generated approximately three million dollars in annual revenues from 1978 on (DFO [1981d, 5]).

In summary, the ECO fisheries have grown since the imposition of the EEZ although the rate has been limited by the federal government's ship licensing policy. The harvesting sector, sharing the catch with foreign fleets, has expanded its overall share from a low of thirty-three percent in 1974 to eighty-one percent in 1981 as stocks improved (DFO [1981b, 45]). The forecast is that the industry will continue to expand as Canadian fishermen receive increasing shares of the increasing stocks. The government, however, is unwilling to license Canadian harvesting of the entire TN category although the harvesting sector is lobbying for such approval. A study by DFO has concluded that Maritime capacity in fleet, processing and freezing is adequate for peak load total allowable catches until 1985 (Ferguson and Brander [1978, 20-29]). Opening up the TN fisheries, would therefore necessitate either the construction of new processing plants and/or on-board processing cold water vessels.

III. Strategies for Fisheries Development

The lobbying for increased access to Canadian fishing stocks is supported for various reasons by economists interested in fisheries development. Tomlinson and Vertinsky (1975, 2569), advocate "full exploitation and the export of any surplus above domestic requirements". Tomlinson and Brown (1979, 251), believe that the value of the offshore fisheries is enough to justify its exploitation by industry. Copes (1978, 155) argues that shifting fishing effort from foreign to domestic harvesting would increase productivity, raise incomes and decrease present subsidies in the industry. The first two articles discuss four possible strategies of fisheries development: an independent strategy, licensing of foreign effort, foreign direct investment and the international joint venture. These strategies, which are not mutually exclusive, are analyzed largely in the context of Less Developed Coastal States (LDCS) where the purpose of fisheries development is to increase domestic food production and/or reduce food imports (Bell, [1978, 173]). In the Canadian case, given the present surplus, the effect of development would be to increase potential exports.

The first strategy is that of developing the fisheries independently of foreign investment, by using domestic capital in preference to foreign capital. It is attractive politically, especially to the fishing community, according to Tomlinson and Brown (1979, 256). A coastal state which is able to mobilize capital on its own domestic markets and/or through government subsidies, can channel funds into the fisheries industry in such a way as to control the pace and location of growth. However, since most LDCS must rely on foreign funds and the technological transfers that accompany them, the independent strategy is not recommended by these authors for LDCS development.

The second strategy is that of allocating surplus fish to foreign fleets and charging license fees for access. The purpose of licensing is to raise revenues which are earmarked for development of the local fisheries industry. License fees, although easy to administer, are rejected in the literature, on the grounds that they would (a) be inadequate for domestic expansion (Tomlinson and Vertinsky [1975, 2571]); or (b) cause the foreign fleets to vacate the fisheries (Copes, [1978, 161]).

The third strategy is foreign direct investment in the fishing industry. If the foreign firm makes an investment in new plant and equipment, using its own capital, the host country benefits from balance of payments inflows, increased employment and tax revenues, and possible transfers of technology and skill. However, foreign direct investment can generate reverse profit flows and reduce domestic decision making, causing a loss of sovereignty and frustration of economic policies (Caves and Jones [1973, 494]). Foreign direct investment is therefore considered less perferable than the fourth strategy, the international joint venture (IJV).

The IJV is an enterprise designed for the mutual benefit of two legally separate interests which includes a commitment of funds, facilities and services by both partners (Tomlinson and Vertinsky [1975, 2574]). The structure of the relationship can vary in length of time, ownership of areas, allocation of returns, and division of responsibilities. The literature suggests that these factors would shift in favour of the domestic partner over time (Tomlinson and Brown [1979, 253]). An advantage of the IJV is that joint decision-making can lead to more local procurement, better marketing policies and greater compliance than can be expected of foreign direct investment. Also jointness of the operation may reduce the threat to sovereign rights (Tomlinson and Vertinsky [1975, 2574]). The inputs of foreign capital can reduce the demand for government subsidies, or lessen pressures on domestic capital markets. The disadvantages of the IJV fall into two classes: the first deals with the willingness of either partner to share expected future profits; the second with the reduced independence that can result from sharing the activity (Tomlinson and Brown, [1979, 257]).

The impetus for foreign fleets to participate in an IJV is a function of constraints imposed upon their supply of fish. The incentive for domestic firms to participate is the opportunity to harvest and/or process more of the underutilized species for which foreign prices are higher than domestic prices (Kaczynski [1979, 43]). The sharing of the activity can be composed of foreign fishing effort and domestic processing, or domestic harvesting with foreign onshore processing. The foreign firm doing some of its processing onshore, can enter an IJV with an existing, but underutilized domestic plant or, jointly, they can expand processing capacity with a new plant. The joint use requires co-ordination of fishing effort and some means of allocating responsibilities and returns, both difficult problems.

The literature assumes that the IJV is preferred by the domestic nation to foreign direct investment in which control is vested in the foreign firm. It also assumes that the bargaining power of the government is such that an IJV rather than foreign direct investment can be imposed upon the foreign fleets. The reason why the IJV is preferred to the other strategies for development is linked to the concept of the EEZ. The existence of the EEZ is interpreted to mean that the coastal state has ownership of the renewable resource and therefore the legal rights to manage the stock, allocate harvesting, and define the existence of a surplus that may be distributed to foreign fleets (Copes [1978, 158]). The owner of the resource thus can choose the development tool most likely to generate the greatest long run net benefits to its economy. The IJV is assumed to be the preferred method because the domestic government can exercise control over the terms and arrangements of the joint venture, its timing and conclusions.

In considering the ECO fisheries as a particular application of this literature, we note first of all, that Canada is, par excellence, a developed coastal state (Copes, [1979, 257]). The ECO fisheries have ~~expanded independently of any foreign capital, and projected capacity is adequate to 1985. Since total allowable catches (TAC) are projected~~ to increase at a decreasing rate through the late 1980s (DFO [1981b, 45]), present domestic capital sources such as reinvested earnings and loans are adequate for net investment. Foreign license fees currently applies to the TN and N categories are earmarked not for development but to cover stock management and surveillance costs. An extra benefit is the possibility of increased quotas and/or decreased tariffs for Canadian fish sold to these foreign nations.

Foreign direct investment has not been encouraged by the Canadian government because existing harvesting and processing capacities are adequate for the TAC. Also the fisheries have not been profitable enough to induce foreign investment (Copes [1978, 156]). Similar comments apply to the IJV; in addition, willing and co-operative foreign partners have not been found. Domestic firms might be willing to form IJV's in certain circumstances because there is excess processing capacity, most of it determined by seasonality (Ferguson and Brander [1978, 27]). If an underutilized domestic plant could receive a seasonal surplus of one species at a time when the host firm had a shortfall of fish, a mutually beneficial IJV could be formed. However, the Canadian government is unwilling to encourage the IJV unless it meets certain conditions: it must be temporary, bring technical knowledge, increased capability, quality improvements and increased access to foreign markets (Weeks [1979, 38]).

We conclude that "development" as envisaged in the literature is not necessary at present for the ECO fisheries. The implicit assumptions necessary to justify development via foreign investment or the IJV are inappropriate to the ECO case. Section IV below discusses some alternative development strategies.

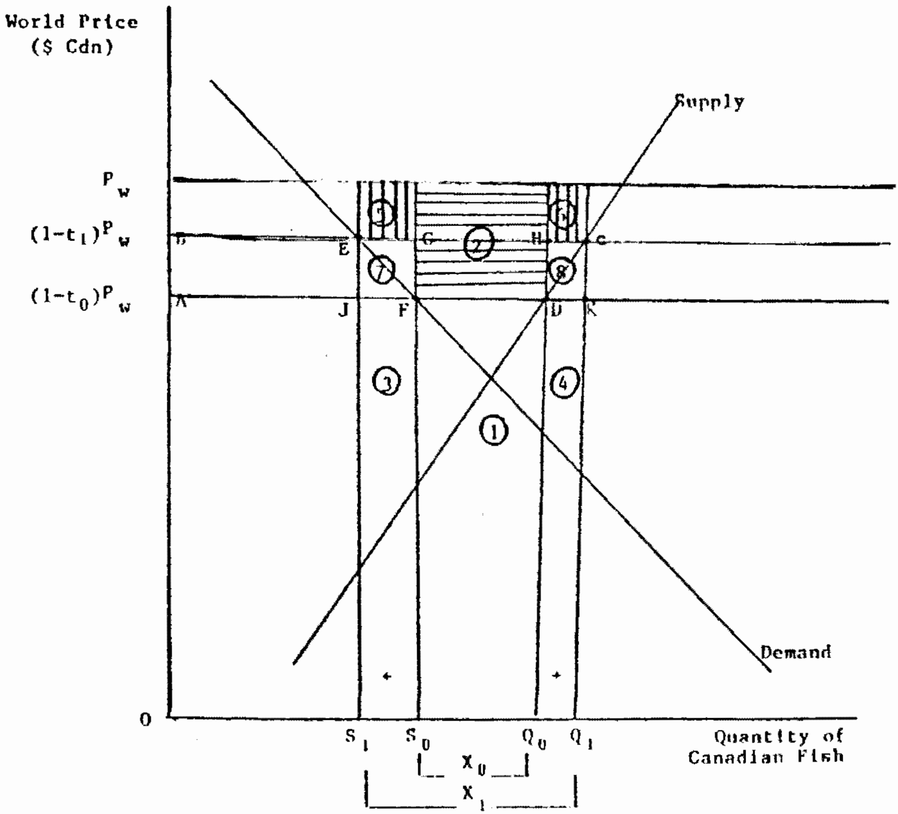
IV. Alternative Strategies

Strategy 1: The Current Development Policy

The Canadian government sets foreign harvesting quotas each year for the TN and N categories in addition to charging foreign fleets license fees. In return for access to Canadian fish, foreign governments, especially in Europe, grant market access to Canadian processors of the TT and TN categories either in the form of reduced tariffs or increased quotas, or both. For example, Canadian fish exported to the EEC generally face tariffs higher than those of European non-EEC member exporters, but reciprocal benefits from the EEC include an extra allocation of Canadian fish at the same or a lower tariff rate.(1) Canadian processors gain because they can still sell the previous quantity at the original tariff rate, plus sell the extra allocation at the lower tariff. The effect of this is similar to an

FIGURE 1

The Benefits to the ECO Fisheries from Preferential Access to Foreign Markets



implicit export subsidy granted to domestic processors. This is illustrated in Figure 1 below.

Figure 1 shows the benefits to Canadian fish exporters of preferential access to foreign markets. Assuming the ECO industry is a price taker on world markets, tariff costs must be absorbed by the exporting industry. That is, if P_w is the average world price of fish, and t_0, the average ad valorem tariff rate levied by foreign nations on fish imported from the ECO fisheries, the net return to exports is block 1 in Figure 1 (i.e. $(1 - t_0) P_w X_0$). Now assume the foreign nation reduces the tariff rate to t_1; permits additional fish imports; and ECO exports of T and TN fish expand to fill the quota. Tariff costs are now blocks 2, 5 and 6. Assuming initial full employment of resources the net benefit to ECO exporters from preferential access is the gain in producer surplus (ABCD) minus the loss in consumer surplus (ABEF) minus tariff costs (FGHD). The net welfare gain is therefore triangles EFG plus DHC. Also, if the additional production, $Q_1 - Q_0$, uses previously unemployed resources (i.e. substantial excess capacity exists in ECO processing), the factor earnings so generated (a maximum of $Q_0 DCQ_1$) are also welfare gains for Canada.

If, on the other hand, Canada does not have preferential access; it can subsidize additional export sales equal to $X_1 - X_0$. The subsidy, blocks 7 and 8, although paid to the ECO processors, is applied against tariff costs equal to blocks 5, 6, 7 and 8. Assuming full employment, there is now, however, a net welfare loss to Canada equal to triangles JEF and DCK because the subsidy (captured by the foreign nation in tariff revenues) induces a misallocation of resources into additional exports. However, if unemployed resources are used, increased factor earnings can offset this loss.

In summary, preferential access benefits the ECO fisheries because the foreign nation transfers some of its gains from trade to Canada in the form of a higher net of tariff price for ECO exports. Net welfare gains are positive and, to the extent that increased production employs previously unemployed resources, these gains are increased. Canada can duplicate the effects on the ECO fisheries of preferential access by an export subsidy. However, since the subsidy in effect is paid to the foreign nation in tariff costs, the net welfare effects are negative. These can be offset if unemployed factors are drawn into the ECO industry.

<u>Strategy 2: Reduction of Foreign Quotas Together with Domestic Incentives</u>

If the Canadian government decided to increase ECO fish exports by expanding the Canadian share of TAC at a faster rate; it could combine lower foreign quotas with direct subsidies or tax incentives to the ECO industry. Since the amount of foreign fish harvested would be reduced, this strategy assumes that there would be no foreign retaliation (i.e. reduced quotas, removal of tariff preferences) and that foreign demand would increase sufficiently to buy the extra exports. Domestic subsidies could be tied to harvesting and processing of the increased domestic TAC or to exports (as discussed earlier). Such subsidies might be more effective than tax incentives which are less visible to the taxpayer and only useful to firms with taxable profits. If the tax incentives are tied to export sales (e.g. U.S. DISC legislation) or export subsidies are used, the ECO fisheries would benefit. There could be a problem however, if Canada was faced with dumping charges in its export markets as a result. Retaliation would clearly defeat the purpose since the subsidies/incentives would them accrue to the foreign nation in higher tariffs or anti-dumping duties.

Strategy 3: Third Market Trade

Another possibility for increasing Canadian exports is the development of third market export trade in conjunction with an onshore processing IJV. A European nation, processing in Canada for the American market, would benefit from reduced transportation costs to the U.S. market (Tomlinson and Vertinsky [1975, 2574]). Assuming the United States, a net importer of fish (Bell, [1978, 363]), absorbs the extra fish processed in Canada, there would be an equal increase in Canadian exports to the U.S. and a decline in the foreign nation's U.S. exports. The strategy of using the IJV for third market exports rather than as a replacement for a current long distance fishing operation could be attractive to a foreign fleet. It would continue to utilize its offshore harvesting capacity of vessels and manpower; continue to have access to the Canadian fishing stock; and retain for its own consumers fish destined for those markets. The foreign fleet, making an investment in Canada, would share in the profits of the venture. If the exported fish sold on the American market at a price equivalent to the price previously received by the foreign firm (a not unwarranted assumption) the profits of the processing IJV could increase. The increase would depend upon the differences in processing costs (onshore versus offshore) and transport costs. Since onshore costs at least initially would be higher if new plants had to be constructed, and the fall in transport costs might not be large, total costs could be higher, in which case subsidies and/or tax incentives to the foreign fleet would be necessary to induce onshore processing for re-export. Benefits to Canada would include the investment from the IJV, increased export sales, possible technological knowledge, an increased tax base, and additional value added and employment. This strategy would, however, not be feasible if (a) the foreign fleet fished solely for its domestic markets and not for export; (b) total costs of the third market trade were much higher than the current foreign offshore processing costs; and (c) government incentives to encourage onshore processing for export to the U.S. market led to U.S. anti-dumping charges and countervailing duties.

Strategy 4: A Variable Licensing Policy

Alternatively, if the government wanted to develop the ECO fisheries by increasing the Canadian share of harvested TN fish or increasing the share of processing done onshore, it could raise license fees on foreign fishing effort. As the "sole owner" of the resource the Canadian government has the power to vary licenses and to set quotas on the offshore foreign sector. As noted earlier, current Canadian license fees are proportional to total gross registered tonnage and to days fished for each foreign nation. Total fees only cover administrative costs and are not designed to extract rent or to maximize the net benefit to Canada from the foreign fishing effort. By raising these fees and/or varying the rates, the government could reduce foreign harvesting (leaving more for the ECO fisheries) or encourage foreign onshore processing. In the short run such licenses might be absorbed as fixed costs by the foreign fleet; however in the long run, foreign fishing effort would probably decline. An analysis of this strategy is continued in Section V below.

V. A Simple Model of the Foreign Fishing Fleet

A. License Fees on Harvesting.

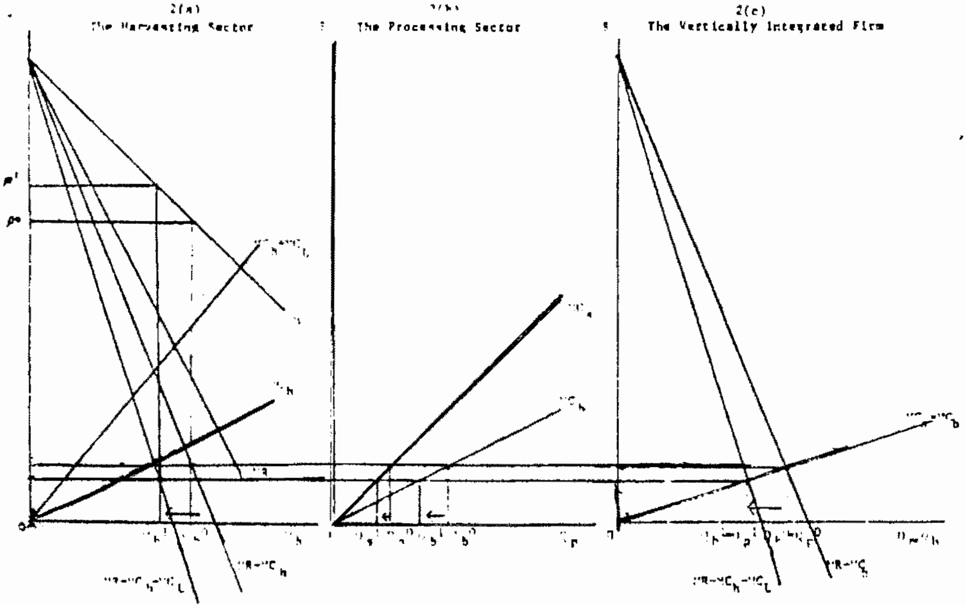
Let us assume we can treat the foreign fleet of a single nation as a profit-maximizing firm. The firm harvests fish (Q_h); processes it (Q_p) onboard boats (Q_b) and/or at an onshore plant (Q_s); and sells the processed fish in its domestic market at price P. Assuming the foreign firm's cost curves for processing on boats and onshore slope upwards and that onshore costs are higher,(2) the firm behaves as a multiplant monopolist, allocating output between the two plants until marginal costs are equalized. If the firm is a price maker in its domestic market, profits are maximized when $MR - MC_h = MC_b = MC_s$; i.e., where marginal sales revenue net of marginal harvesting costs equals marginal processing costs both on and offshore. This is illustrated in Figure 2 below.

Figure 2(a) shows that the net marginal revenue from harvesting fish, $MR - MC_h$, falls as Q_h rises, while in 2(b), the marginal cost curves for processing on and offshore rise as Q_p rises (as required in Appendix 1 by the second order conditions for a profit maximum).(3) In 2(c) the intersection of the horizontal summation of the MC of processing curves with the net marginal revenue from harvesting curve determines the optimum level of processing and harvesting, $Q_h^0 = Q_p^0$. This intersection satisfies the first order condition for a profit-maximum: $MR - MC_h = MC_b = MC_s$. The firm processes Q_b^0 offshore and Q_s^0 onshore, where $Q_b^0 > Q_s^0$.

Now let the home country set a license fee positively related to the volume of foreign harvesting. Since MC_L, the marginal licensing cost, is positive and increasing as Q_h rises, the net marginal revenue from harvesting declines. The firm incorporates the license fee into its optimizing behaviour and now equates $MR - MC_h - MC_L = MC_b = MC_s$. As a result total harvesting and processing, both on and offshore, decline

Figure 2

The Long Run Response of a Foreign Fleet to Variable License Fees on Foreign Harvesting



with part of the license costs being passed on to foreign consumers in higher prices. Clearly beyond a certain point the license fees can become prohibitive and the foreign firm will then exit the industry.

The benefits to the domestic country from licensing foreign harvesting are the revenues collected, plus the extra fish stocks available to the domestic fishing industry as Q_h falls, minus the loss in value added, employment, etc. as onshore processing declines. Since in the Canadian ECO case foreign fleets do not process onshore ($Q_s = 0$), the net benefits from licenses tied to foreign harvesting are positive. Also, because foreign license fees are currently very low and foreign demand for access to Canadian fishing grounds is strong, the fees could probably be raised substantially (both the level and the rate) without a great reduction in foreign harvesting. This implies that the major benefit to the ECO fisheries from increased and variable harvesting licenses on foreign fleets could be larger revenues rather than reduced foreign effort.

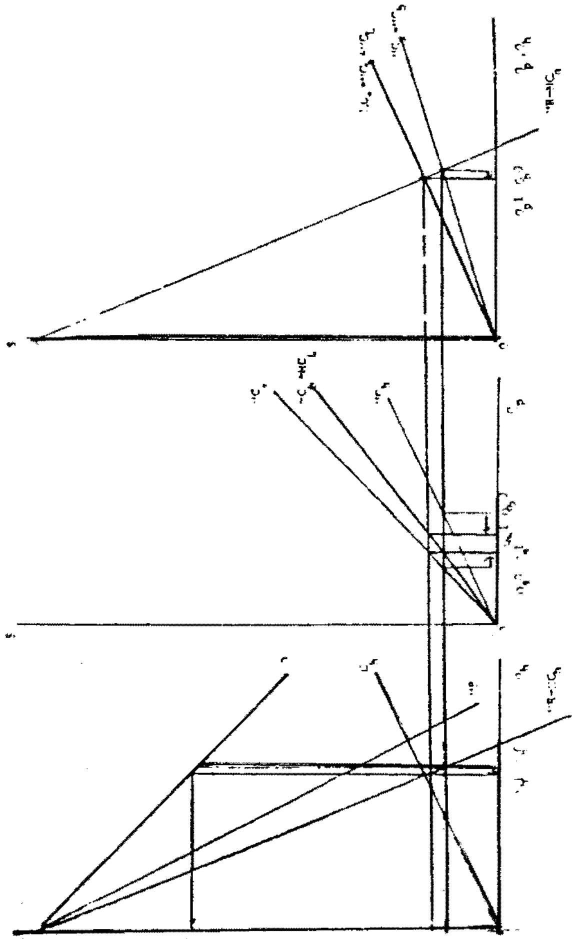
B. Differential License Fees on Foreign Processing

If the goal of the domestic nation is to encourage foreign fleets to process onshore, either through direct investment in the processing sector or an IJV with a domestic plant, the government can encourage this development by setting higher license fees on offshore than onshore processing. In the Canadian ECO case this would imply high license fees on offshore processing or subsidies to onshore processing since $Q_s = 0$. Let us now assume the domestic government levies a variable license fee on offshore processing only. The effects are illustrated in Figure 3. The firm incorporates the license fees into its optimizing decision and chooses the level of harvesting and processing where (see Appendix I[B]) $MR - MC_h = MC_b + MC_L = MC_s$; i.e. the net marginal revenue from harvesting equals marginal offshore processing and licensing costs which equal marginal onshore processing costs. Total harvesting and processing declines but onshore processing increases in both absolute and relative size. License fees are generated which are partly passed on to foreign consumers in higher prices.

The benefits to the domestic economy of licensing offshore processing include the license revenue, reduced foreign harvesting and increased onshore processing. These benefits can be reduced to the extent that (1) cost differentials between on and offshore processing are so large that subsidies are needed to encourage onshore processing; (2) the foreign fleet overprices the fish sold to the processing plant in order to minimize onshore profits and net value added; or (3) foreign nations retaliate by reducing quotas or raising tariffs on imports from the domestic country. In the Canadian ECO case high variable license fees on offshore processing would probably generate substantial revenues with little reduction in the volume harvested or encouragement to onshore processing. Substantial subsidies or incentives (offsetting the revenues from offshore processing) would be needed to encourage foreign direct investment or an IJV in the domestic processing sector. If

Figure 3

The Long Run Response of a Foreign Fleet to Variable License Fees on Offshore Processing



license revenues are offset by onshore subsidies, total foreign harvesting need not decline so that the net benefits to the Canadian Economy would be reduced.

VI. Selecting the Optimal Development Strategy

"Development" as defined in the literature is interpreted to mean that a nascent industry will grow in both the inshore and offshore sectors; that it will expand until the industry is able to exploit all the fish within its jurisdiction; and that markets, either domestic or foreign, exist for the output. According to this definition the ECO fisheries are not yet developed. Nearly 100 percent of the TT and eighty percent of the TN category are exploited, but the Canadian fleet does not have the capability to fish in non-traditional waters, nor the capacity to harvest and process non-traditional species (Copes [1978, 160], Ferguson and Brander [1978. 36]).

If export markets are not a problem, then the industry could be allowed to expand using domestic or foreign capital, or some combination of the two. The Canadian government has the power to define a TAC for any fishery within the EEZ, but has also agreed to allow foreign fleets to fish anything "surplus" to its needs (Copes [1978, 158]). Therefore it is unlikely to make any rapid changes in its policy. It is clear, however, if faster expansion were the goal of government and if foreign capital had a lower opportunity cost than domestic capital, that this expansion could possibly be achieved with variable licenses levied on foreign harvesting or offshore processing. The foreign fleet, faced with high variable licenses and restrictive supply-side constraints, would probably pay the high access fees but refuse to participate in onshore processing unless induced to do so by subsidies or tax incentives. If the licenses were high enough the foreign fleet would in the long run shift to other fishing grounds.

We can assess the benefits and costs to Canada of levying prohibitive license fees as follows. Let us assume the foreign fleets do leave the Canadian fisheries and move to distant waters (reducing the possibility of stock depletion along Canada's 200 mile limit); open their borders to Canadian fish exports; and do not retaliate for the lost access to Canadian waters. Assume also that Canada now harvests and processes all of the fish available to it and exports surplus stocks. Zero foreign license revenues plus the expansion costs for extra processing and harvesting would be the major costs to Canada. The benefits would be increased exports, employment and more onshore processing. If we drop the assumptions of open access to foreign markets and no retaliation, the net benefits are clearly reduced since Canadian exports would decline. And if the foreign fleets simply move outside the 200 mile limit stock depletion could still continue.

The costs and benefits of continuing the current Canadian policy in which foreign fleets exploit the underutilized and unutilized stocks can also be assessed. The fleets pay low license fees tied to total vessel tonnage and days fished, and they accept the fact that the cost of access to the Canadian fisheries includes some reciprocal privileges granted to Canadian exporters. The net benefits to Canada are these fees plus preferential access to export markets. Since the ECO fisheries do not have the capacity at present to harvest and process the TN and N fish currently allocated to the foreign fleets, the opportunity cost to Canada of allowing foreign access to these stocks is minimal. The foreign fleets, however, do have excess capacity, so the net benefits to these nations are the revenues from the harvested and processed fish. If the fleets could have been employed elsewhere, net benefits are reduced by the factor earnings in the alternative location. Therefore Canada can increase its net benefits from the ECO fisheries by raising license fees and/or seeking better preferential arrangements, as long as the cost to the foreign nations is less than the net value of their quota allocations in Canadian waters. Appendix 2 attempts to measure the net benefits to Canada and to the EEC of the proposed 1982 Canada-EEC treaty for the ECO cod fishery.

The optimal strategy we recommended to develop the ECO fisheries is thus to allow the foreign fleets continued access to the TN and N categories but to increase the license fees and negotiate better preferential arrangements. Some foreign harvesting could be discouraged by tying graduated license fees to quantities of harvested fish. By coupling the currnt strategy of restricting Canadian access to the TT category and foreign access to the TN and low valued N categories, with deliberate policies of high graduated licenses based on foreign harvesting efforts and valuable tariff and quota concessions from foreign nations, the net benefits to Canada of the ECO fisheries could be greatly increased. A strategy allowing ECO firms to harvest and process all categories, on the other hand, would be self-defeating if foreign nations retaliate. Similarly, a strategy of developing onshore processing via direct foreign investment or an IJV is unlikely to succeed in the ECO fisheries. Since foreign fleets fish for their own markets; and TN and N categories are not high valued in the Canadian market; and Canadian fish production already exceeds consumption, foreign onshore processing could only develop under large subsidies, tax incentives or assured access to the U.S. market.

VII. Conclusions

The development options for the ECO fisheries found in the literature are the independent strategy, licensing, the foreign subsidiary and the IJV. The implicit assumption in this literature is that in the long run, Canada would harvest and process all the fish available. Utilizing the entire stock is also the choice of industry spokesmen and fishermen's organizations. It is, however, only with restrictive assumptions that such a policy would maximize net national benefits from the ECO fisheries. This paper concludes that the optimal policy is to institute a system of high variable foreign licenses tied to offshore harvesting and continue to share the surplus with foreign fleets in return for preferential access to their domestic markets.

Footnotes

(1) The Canadian-ECC bilateral fish agreement expired in 1980 and is currently being renegotiated. The federal government is pressing for reduced tariffs and larger quotas on ECO exports to the ECC.
(2) The foreign firm considers onshore processing costs to be higher than offshore costs because onshore processing (a) requires additional investment in plant and equipment; (b) implies the domestic nation can tax onshore profits; and (c) results in reduced independence for the foreign firm.
(3) The slope of MC_h can be negative as long as MR - MC_h falls as Q_h rises. The literature on maximum sustainable yield, however, suggests that $dMC_h/dQ_h > 0$ (Bell [1978, 118]).

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Appendix 1

Licensing a Multi-Plant Monopolist

A. A Variable License on Harvesting

$$\pi = P(Q_p)\cdot Q_p - C_h(Q_h) - C_b(Q_b) - C_s(Q_s) - K(Q_h)\cdot Q_h + \lambda_1(Q_h - Q_p)$$
$$+ \lambda_2(Q_p - Q_b - Q_s) \qquad (1)$$

where

π is the profit of the foreign firm

P is the price received by the foreign firm for processed fish;

$P = f(Q_p)$, $dP/dQ_p < 0$

C_h is total cost of harvested fish, $C_h = c(Q_h)$, $dC_h/dQ_h = MC_h > 0$

C_b is total cost of onboard fish processing; $C_b = g(Q_b)$, $dC_b/dQ_b = MC_b > 0$

C_s is total cost of onshore fish processing; $C_s = s(Q_s)$, $dC_s/dQ_s = MC_s > 0$

K is the per unit license fee on harvested fish; $K = l(Q_h)$, $dK/dQ_h = MC_L \geq 0$

$Q_h = Q_p$; all harvested fish are processed and sold by the foreign firm

$Q_p = Q_b + Q_s$; all fish are processed either offshore or onshore

Therefore:

$$\pi = P(Q_h)\cdot Q_h - C_h(Q_h) - C_b(Q_b) - C_s(Q_s) - K(Q_h)\cdot Q_h + \lambda(Q_h - Q_b - Q_s) \qquad (2)$$

The first order conditions for a profit maximum are:

$$\partial\pi/\partial Q_h = MR - MC_h - MC_L + \lambda = 0 \qquad (3)$$
$$\partial\pi/\partial Q_b = -MC_b - \lambda = 0 \qquad (4)$$
$$\partial\pi/\partial Q_s = -MC_s - \lambda = 0 \qquad (5)$$
$$\partial\pi/\partial\lambda = Q_h - Q_b - Q_s = 0 \qquad (6)$$

which can be rewritten as:

$$MR - MC_h - MC_L = MC_b = MC_s \qquad (7)$$

Differentiating (3-5) totally, the second order conditions for a profit maximum are:

$$dMR/dQ_h - dMC_h/dQ_h - dMC_L/dQ_h < 0 \qquad (8)$$
$$dMC_b/dQ_b > 0 \qquad (9)$$
$$dMC_s/dQ_s > 0 \qquad (10)$$

B. A Variable License Fee on Offshore Processing

$$\pi = P(Q_h)\cdot Q_h - C_h(Q_h) - C_b(Q_b) - C_s(Q_s) - K(Q_b)\cdot Q_b + \lambda(Q_h - Q_b - Q_s) \qquad (1)$$

where $K = m(Q_b)$, $dK/dQ_h = MC_L \geq 0$

The first order conditions for a profit maximum are:

$$\partial\pi/\partial Q_h = MR - MC_h + \lambda = 0 \qquad (2)$$

$$\partial\pi/\partial Q_b = - MC_b - MC_L - \lambda = 0 \qquad (3)$$

$$\partial\pi/\partial Q_s = - MC_s - \lambda = 0 \qquad (4)$$

which can be rewritten as:

$$MR - MC_L = MC_b + MC_L = MC_s \qquad (5)$$

Differentiating (3 - 5) totally, the second order conditions for a profit maximum are:

$$dMR/dQ_h - dMC_h/dQ_h < 0 \qquad (6)$$

$$dMC_b/dQ_h + dMC_L/dQ_h > 0 \qquad (7)$$

$$dMC_s/dQ_s > 0 \qquad (8)$$

Appendix 2 is obtainable for the Authors upon request