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Consumer Surplus, Producer Surplus, is there a Country Surplus?  
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Abstract

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Extended jurisdiction through unilateral action or the Third Law of the Sea Conference has created a demand for and supply of fishery resources used by distant water fleets. This paper is a description of the theoretical characteristics of the developing market for fishery resources used by distant water fleets. The requirements of the Fishery Conservation and Management Act of 1976, P.L. 94-265, on setting fees to be charged foreign countries are discussed. Consideration to productivity and costs of production needs to be given in setting fee schedules.

### I. Introduction

Today there are 37 nations holding a claim to a territorial sea or exclusive fishery zone greater than 12 nautical miles (nm). The Third Law of the Sea Convention (LOS) is methodically moving to extend coastal fishery limits out to 200 nm. The United States has just passed P.L. 94-265, Fishery Conservation and Management Act of 1976, which extends fisheries jurisdiction to 200 nm. The question is: Can nations charge for the privilege to fish in their claimed exclusive fishery zone? If so, how much can they charge? What criteria need to be considered in making this determination? The purpose of this paper is two fold: (1) to explore what needs to be considered when setting fees to charge for fishing in an exclusive fishing zone and (2) to consider the foreign fee setting criteria of P.L. 94-265.

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Being able to charge for fishing privileges is a fairly recent phenomenon. The first extension of fishery limits beyond 12 nm was by some Latin American countries in the 1950's. Extensions of fishery limits have become rational because two factors: (1) increasing demand combined with (2) improved technology making it possible for the fish to take on value while they are still in the water. Prices that people are willing to pay for the limited amount of fish available are higher than the total costs of making those fish available. It is the economic value that coastal nations are trying to capture and protect by unilateral extension of jurisdiction or through the Third LOS.

\* In a sense an international market for fishing privileges is now forming. As such, all of the factors affecting this market or group of markets need to be identified and evaluated. Nations with coastal fisheries form the supply. Demand is formed by the nations with distant water fishing fleets. The institutions for organizing and conducting this market are in the process of developing. The framework for these institutions will be constrained by the physical conditions of the fisheries and current legislation. The future structure of these institutions, however, will be clearly affected by people producing and using fisheries.

Since the market for fishing privileges is a submarket of the overall market for fish, the market for fishing privileges will be very much affected and constrained by the demand for fish and the cost of producing fish.

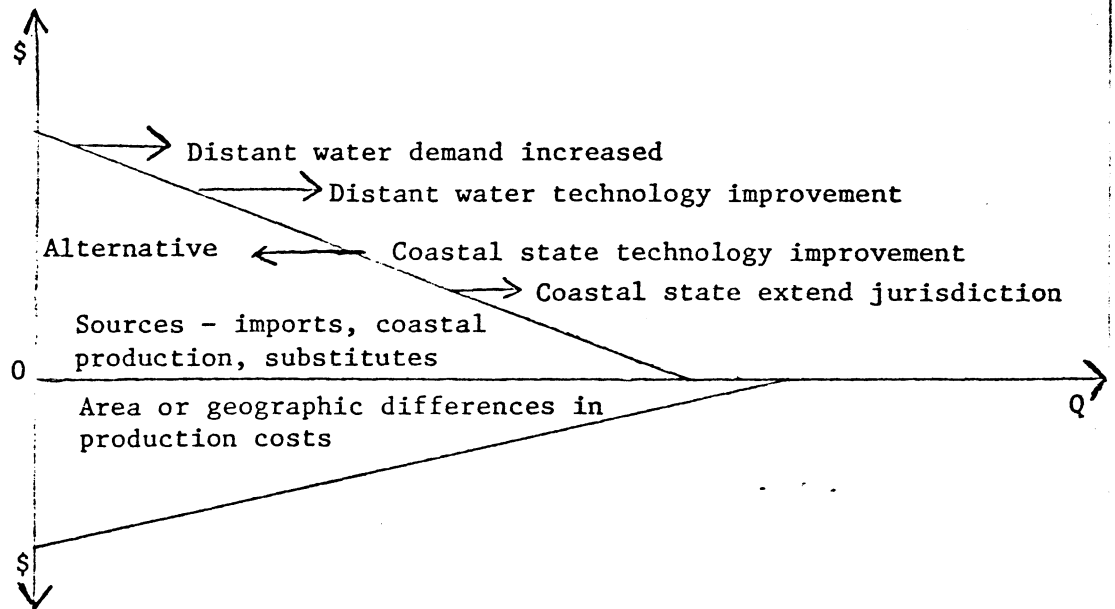
## II. Demand

The demand for distant water resources by distant water fleets is made up of a derived demand from alternative sources such as imports, coastal production and substitutes. Demand for distant water resources will increase

because of an increased demand in distant water fishing countries.<sup>1/</sup>  
 As distant water technology is improved demand for distant water resources will increase.<sup>2/</sup> Coastal state extension of jurisdiction will also increase the demand for distant water resources (what distant water fleet will pay) because there would be fewer free alternatives. On the other hand improved technology in a coastal state would decrease the demand for resources by a distant water fishing fleet because imports from that coastal state would be more competitive.

Distant water fleets would be willing to pay owners of some fishery resources more than what they would have to pay for alternative sources such as from imports, coastal production, or substitutes. To owners of highly productive resources, or resources that are closer to distant water fleet's home ports, so that harvesting costs are lower, distant water fleet owners would be willing to pay a premium. This area is shown below the line in Figure 1.

Figure 1. Demand by distant water fleets and area geographic difference in production costs.



<sup>1/</sup> Japan, USSR, etc.

<sup>2/</sup> An example the U.S. tuna purse seine fleet in the late 1950's and 1960's.

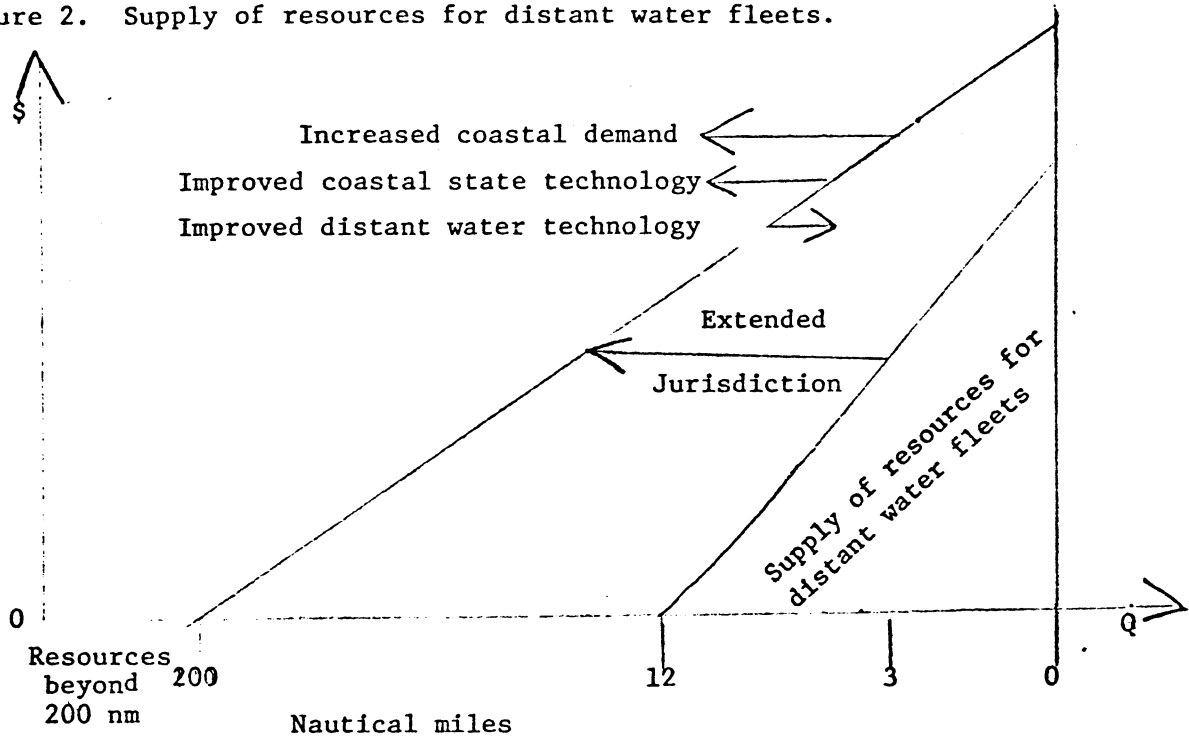
### III. Supply

For several hundred years the supply of resources for distant water fleets has been unlimited and free for all practical purposes. Coastal countries only had control of their resources out to 3 nm until recently when most nations went to 12 nm after the 1958 LOS Convention. This left most of the world's fishery resources under no control or limited control by international organizations set up for that purpose. There was no intersection of a demand curve for distant water resources and a supply curve of resources for distant water fleets. Unilateral extension of jurisdiction to 200 nm and the Third LOS is changing all of this.

\* This action reduces the supply of resources for distant water fleets and shifts this supply curve to the left (Figure 2). Nearly all of the fishery resources, except the highly migratory resources, are within 200 nm of some coast. Then there would be an intersection of the demand curve for resources by distant water fleets and the supply curve of resources for distant water fleets. A market for these resources would develop. Fees could be charged by the coastal country and would be paid by the distant water fleet.

Other factors affecting the position of the supply curve of resources for distant water fleets are similar to those factors affecting the demand. With an increase (decrease) in coastal state demand there would be a decrease (increase) in the supply of resources for distant water fleets because the supply would be a residual left after that taken by the coastal fleet. Improved coastal state technology would also shift the supply curve to the left as reduced production costs would replace imports and/or increase exports. By the same token improved distant water fleet technology would have the opposite affect. An increase in demand in both coastal and distant water fishing countries would increase the fees and economic

Figure 2. Supply of resources for distant water fleets.

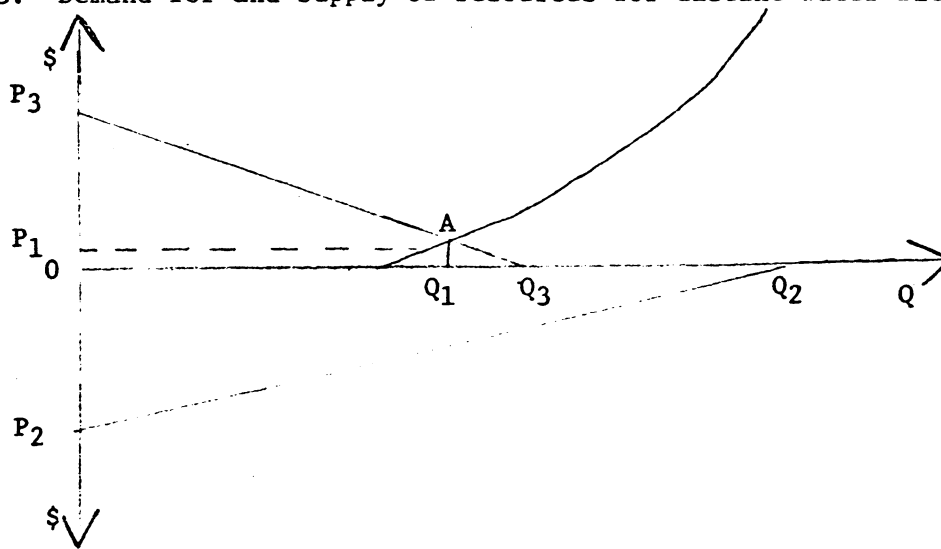


rents for resources used by distant water fleets. Improved distant water technology would shift both the demand and supply curves to the right leaving the level of fees stable but increasing the potential total economic rent from distant water fleets. Improved coastal fleet technology would shift both curves to the left and decrease the potential total economic rent from distant water fleets.

According to Sec. 204(b) (10) of P.L. 94-265 the United States cannot discriminate between countries in charging fees to distant water fleets. This means that the United States cannot capture all of the consumer surplus which would be represented by the area  $P_3OQ_3$  of Figure 3, but only  $P_1OQ_1A$ . The United State could, however, capture that area below the line in Figure 3,  $OP_2Q_2$ , which represents the differences in productivity and costs of production of the various fishery resources under the jurisdiction of the United States without discrimination among countries.

This would be done by charging a schedule of various fees for different kinds of effort regardless of country, various fees for different fishery banks because of location and productivity per unit of input regardless country and various fees for low-valued and high-valued species regardless of country.

Figure 3. Demand for and supply of resources for distant water fleets.



#### IV. Other factors affecting the market for coastal fishing privileges.

The market for coastal fishing privileges is really a group of several related markets. While there is considerable cross-price elasticity between species and especially between geographic producing areas of the same or similar species, there still would be separate markets by types of gear. Some vessels built for one fishery, like a tuna purse seiner, cannot easily transfer to a different type of fishery even if it were in the same area.

The annual fluctuations in the physical productivity of each type of fishery also affect the market for fishery privileges. A stable fishery would develop a higher value of fishery privileges than a variable or fluctuating fishery because producer costs would be lower in the stable fishery. Since the value of the privilege to fish is a residual, the lower (higher) producer

costs with a given price results in higher (lower) values for the privilege to fish.

The issue of transfer from one fishery to another, coupled with the annual fluctuation, brings up the question of the time horizon of a market for fishing privileges. While the range could vary from a few minutes to forever the realistic range is considerably less. A coastal country would not transfer perpetual fishing privileges (rights) to a distant water fleet even though it might consider transferring a limited amount of perpetual fishing privileges to its domestic fishing industry.

From the perspective of the fishing firm the minimum time horizon is a fishing trip which could vary from a day or a week for a coastal fleet to 6 months for a distant water fleet. The maximum time horizon would be the economic life of the vessel which could be to 20 years.

A fisheries management agency could, however, lease fishing privileges up to the minimum expected production during the next 20 years. People investing in the fishing industry would be willing to pay for the privilege to fish without undue interruption during the economic life of their vessel for several reasons. Their cash flow would be fairly stable. Their cost of borrowed funds should be lower. A percentage of the gross would be the easiest way for domestic fishers to pay for the privilege to fish and would be easy to monitor and enforce. The opportunity costs of coastal fishers would be lower than distant water fishers, therefore coastal fishers should be able to outbid distant water fishers for the privilege to fish for the economic life (15-20 years) of the vessel.

During blooms, the available year-classes of fishery resources would be greater than the capacity of domestic fishers with a 15 to 20 year lease



on fishing privileges. This surplus above the capacity of domestic fishers with a lease on fishing privileges would be available for short term allocation to domestic and distant water fishing firms. Distant water fishing firms probably could afford to pay more for those periodic short term allocations because they would be able to move from bloom to bloom during the economic life of the vessel. A domestic fishing firm without a 15-20 year lease on fishing rights would find it more difficult to cover the fixed costs during the limited amount of fishing available to it, unless it had productive multipurpose vessels that could move to other domestic fisheries or other marine work continuously during the economic life of the vessels.

If pulse fishing were allowed, distant water fishing fleets over a longer time period could reduce costs and increase productivity. Under these conditions distant water fishing fleets could pay more for fishing privileges.

\* Extending jurisdiction unilaterally or through a Law of the Sea Conference does not automatically make it possible to create and collect a country surplus from coastal fisheries. There will be a phase that might be \* called nonrecognition. The Latin American countries and the United States are just now completing this phase. The Japanese still do not recognize the Continental Shelf Fishery Resources which resulted from the 1958 LOS Conference. This nonrecognition phase will be followed by a second transitional phase which may last 20 years until all of the investments in these fisheries are based on the new institutions. It is during this transition phase that token fees for distant water fishing privileges would be introduced, established, and brought up to a competitive level.

\* The third and final phase would be the mature phase where fishing privileges would be distributed to distant water fleets on a competitive basis.

Country rents from coastal fishery resources will depend on the alternative resources available to distant water fishing fleets. Productive resources available from Country B, or outside the jurisdiction of any country, limit the country rents that could be collected by Country A. Under these conditions it is in the best interest of Countries A and B, both with coastal fishery resources, to take collective action and present a common front to distant water fishing fleets.

Risks and uncertainties faced by distant water fishing fleets also affect the country rents available from coastal fishery resources. To the extent that institutions for collecting country rents can reduce these risks and uncertainties, the larger will be the collectable country rents. This causes problems for the coastal country. Actions to reduce risks and uncertainties for distant water fishing fleets involve more difficult enforcing arrangements or sharing sovereignty with other countries or an international organization. These include (1) charging for fish caught rather than fishing effort (difficult to enforce), and (2) cooperating with a neighboring country to receive a predetermined proportion of rents from shared resources regardless of the proportion caught the specific year. In the case of highly migratory resources an international organization could collect rents. This could reduce the risks for distant water fleets. If these rents were turned back to the coastal country in proportion to the historical distant water fleet catch in their coastal waters the annual cash flow of rents from these high migratory resources would be greatly stabilized.

Coastal countries need to consider the value of the economic rents that they would be collecting against the secondary costs of reduced productivity of their domestic fishing industry, because of the distant water fleet fishing effort.

#### V. Conclusions and Implications

We have reviewed the some of impacts of extended jurisdiction on economic rents that could exist between distant water fishing fleets and coastal countries. Extended jurisdiction has created a market for fishery resources used by distant water fleets. The various dimensions of this market need to be measured to determine how much coastal nations can charge for their fishery resources. This author has measured the difference in costs of production of an important U.S. fishery which will be the subject of a sequel to this paper. There is a country surplus.

VI. Bibliography

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a "noneconomic" segment for positive vessel day costs.

<sup>6/</sup> From the scallop stock estimates in Table I the stock adjustment equation was estimated for the period 1964-1968 with the results:

$$(a) F(N_t) = \underset{(2.25)}{0.901382N_t} - \underset{(1.07)}{0.001432N_t^2}$$

resulting in  $N_{t+1} - N_t = 0$  at  $N_t = 0$  and  $N_t = 62.95$  million pounds with a MSY = 14.18 million pounds at  $N = 31.475$  million pounds. This stock adjustment equation implies an optimal yield of 14.01 million pounds associated with a scallop stock of  $N^* = 27.98$  million pounds. These figures are over four orders of magnitude less than those obtained from the 1958-1968 data. As such there is admittedly a large degree of uncertainty surrounding the true parameter values in the stock adjustment equation.

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