DISTRIBUTIONAL IMPLICATIONS OF THE EXTENDED ECONOMIC ZONE: SOME POLICY AND RESEARCH ISSUES IN THE FISHERY

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"Welfare economics has a nasty tendency to trail off into philosophy and inaction if pursued far enough (James Crutchfield, 1977, p. 385)".

I. INTRODUCTION

At a recent conference on the economics of extended fisheries jurisdiction, Richard Bishop and I argued that distributional considerations had been largely ignored by economists as they sought to influence public policy (Bromley and Bishop, 1977). Among the reactions to that paper, the least surprising was that efficiency analysis is scientific and value-free, while distributional matters are value-laden, mercantilistic, and concern "love". Another reaction was that to pay undue attention to distributional concerns would freeze us into total incapacity in attempting to "rationalize the fishery." The historical justification for this emphasis on efficiency was that it was difficult enough convincing biologists and policy makers (often one and the same) of the relevance of economics and that therefore it was better to get "half a loaf" rather than nothing. Besides, everyone else is already a "specialist in distribution."

The premise of this paper is that there are important insights to be gained by breaking out of the traditional steady-state/yield-effort models and viewing the economics of extended jurisdication in a welfare theoretic framework. Page restrictions preclude a comprehensive treatment, yet it is possible to offer some analysis which is suggestive of directions in which we might pursue research topics. More importantly, perhaps, I am hopeful that useful policy recommendations might also result.

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In the following section I will briefly introduce my view of distributional matters as they pertain to the fishery. Then, in section III I will present a brief and simple model for assessing the distributional implications of extended jurisdication in an international setting. In section IV I will discuss access to the enlarged "domestic" fishery with the primary motive of reminding economists of the elements hidden in that raw number "fishing effort." Finally, I will discuss some research and policy implications.

II. TOWARD A WORKING DEFINITION OF "DISTRIBUTIONAL IMPLICATIONS"

It is unfortunate that distributional issues get placed in the "love" category, and it is even more serious that distributional concerns are considered to be a mere hinderance to doing "something" in the fishery. That it is controversial and difficult to raise the matter of who-gets-what in the policy arena cannot be denied; but to dismiss its analytical importance for whatever reason is to indicate a serious lack of appreciation for its role in welfare theory. And this brings us to the more serious aspects of the lack of appreciation for distribution. This blind spot exists because the economic models of the fishery are adaptations of firm optimization theory to society as a whole. Let me put it a little differently--distribution has been ignored because we have been using the wrong conceptual framework.

Traditional fishery models consider fishermen not as independent decision-making units but as mere factors of production aggregated into something called "effort". Firms utilize factors of production according to well-established optimization criteria, adding and subtracting inputs as conditions external to the firm change. Here, distribution is beside the point since we assume that there are many willing buyers and sellers of said factors.

And, when distribution is discussed it is in terms of factor payments and income shares.

The yield-effort models hide the fact that we are talking about individual firms who in their turn also hire factors of production according to some optimization criteria. Thus, to use the yield-effort model to deal with aggregates of firms is to apply a microeconomic construct to derive policy prescriptions on a macroeconomic scale; we cannot use firm optimization theory to offer prescriptive advice in the large--that is what welfare economics is about.

Once the fishery problem is cast in a welfare theoretic framework, it is ineluctable that distribution is central to any policy recommendation. How else can one say that social state I is better than social state II? These are fishing families that are being retained or restricted out of the fishery, not mere pounds of fertilizer, acre-feet of water, or tons of bauxite. The appropriate maximand for public policy is aggregate social welfare. And this is not known until the distributional implications are know (Bromley and Bishop, 1977; Graaff, 1967; Mishan, 1969).

The issue then, is how might one begin to develop models of fishery policy which will give explicit recognition to distributional matters? The first obvious step would be to develop a more careful understanding of what is meant by distribution. Is it the Gini Coefficient? Is it the percentage of the population which falls in various income (or wealth) quantiles? Or is it something else?

I prefer to consider distributional matters in the context of <u>entitlements and exposure</u>. Imagine a situation in which an upstream landowner has sold the mineral rights to a party wishing to strip mine for coal. There is also a downstream riparian owner of land upon whom excessive sedimentation

would be deposited if the strip mining occurs. If government takes the side of the strip miner (entitlement) the downstream riparian will suffer losses (exposure), and if government takes the side of the downstream riparian (entitlement), the would-be miner loses (exposure); we assume that slopes are steep enough that reclamation efforts would be ineffectual. Or consider another example: I wish to install a solar collector on my roof but my neighbor to the south happens to have a penchant for tall trees. If government takes my side (entitlement), my neighbor is denied some freedom (exposure), while if the government takes the side of my neighbor I am inconvenienced. Yet another example is found in the famous case of sparking railroad engines; if government protects the railroads the wheat ranchers suffer, and if government protects the wheat ranchers the railroads suffer.

Thus, distribution is here concerned with entitlements to streams of utility and/or wealth over time--in a word, access. But it is also concerned with exposure to the entitlements of others over time--that is, lack of access. The state as an enforcer may help in the determination of entitlements and exposure, but the essence of distributional matters is which party is exposed to the actions of others? Entitlements in an economic system legitimize the imposition of costs on others. My ownership of a piece of land legitimizes the imposition of a cost on anyone who may wish to cross it. My entitlement to dump wastes into a stream legitimizes the imposition of costs on those who may wish the termination of that dumping. Their entitlement to be free of my dumping legitimizes the imposition of costs on me should I want to dump. The structure of entitlements and their enforcement by the state is the mechanism whereby certain costs become legitimized. If I am a fishermen who survives "the cut" then my right of access legitimizes the imposition of costs on those who were not so lucky--

the cost of being denied access to a way of life and a familiar source of income. This is the distributional component which is concealed in the numeraire "fishing effort."

There is anoth aspect of distribution--the international dimension. Here, access has the same meaning, and the entitlement legitimizes the imposition of costs on other countries rather than on other fishermen in the same country. In the subsequent section we will explore--in very brief fashion--the international dimension of entitlements as they relate to distributional issues.

III. INTERNATIONAL DIMENSIONS[1]

Assume that an area of ocean has historically been fished by two nations (A and B) and that A now declares--unilaterally--part of it to be its sovereign territory; the area and its harvest gained by A is lost by B. In Figure 1 we see two interdependent production possibility frontiers (PLA and PLB) representing the initial situation. If either A or B alters its level of fish harvest in the commonly fished area, the production locus of the other will shift.

Once A has declared a portion of the area to be its exclusive territory the two production loci shift to PLA' and PLB'. If we assume that A does not fish in the areas where B also fishes then the interdependence ceases and PLB' represents the actual locus of fish production and other goods for B without access to the area now controlled by A. If relative prices for B remain unchanged its fish harvest would be reduced by the magnitude FB - FB'.

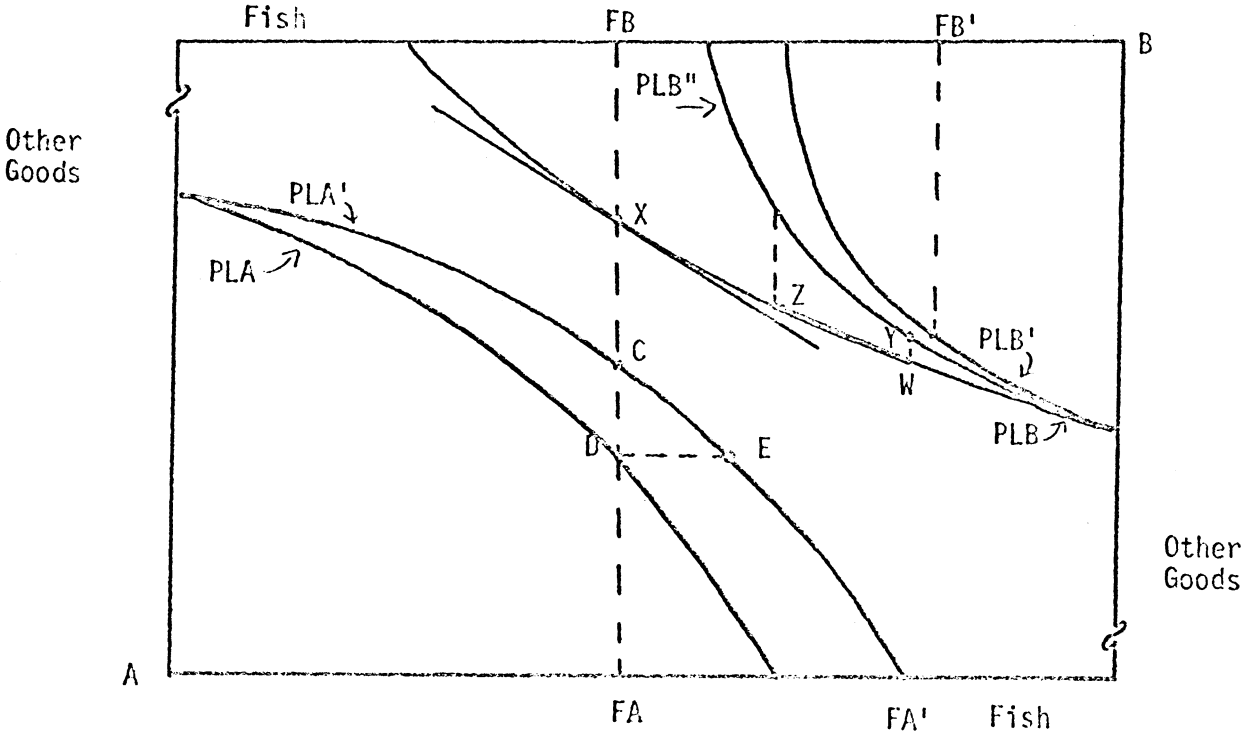
Fish
FB
FB'
B
Other Goods
PLB"
PLA'
PLA
X
Z
Y
W
C
PLB'
PLB
D
E
Other Goods
A
FA
FA'
Fish

FIGURE 1

With B excluded, country A is now theoretically able to move from point D to point E, and we might think of this as the total allowable catch from the formerly jointly exploited fishery. If, the initial open-access situation had represented one of over-exploitation then PLA' can be thought of as representing a recovery of the fishery.

Considering first the impact on country B, we would expect that the exclusion of access to the territory under study would prompt an investment in fishing technoloby and/or the searching for new grounds to make up for those expropriated by A, and hence after some time the production locus of B might shift out to PLB". There, the approximately similar price ratio would result in production of Y. If we assume that B is "settled" at point Y and then country A agrees to allow some harvesting of "foreign catch" in the extended zone, B's effective production locus shifts out to the line segment WZ, with the exact location of Z dependent upon the allowed harvest in the new jurisdiction claimed by A. Since this brings a disequilibrium in B between the marginal rate of product transformation and the ratio of relative prices, it is unclear as to what B will choose to do. If it considers this access as strictly temporary it may choose not to respond to the offer by A. If it is considered to be long-run access then the line segment WZ becomes part of the production locus and B will respond accordingly.

Turning now to country A, there is the decision as to what constitutes optimum yield, and then the decision regarding how much will be harvested by A, and what can then be offerred as "foreign catch." The line segment CE on PLA' represents that locus of output possibilities where it is possible to gain in both outputs. It seems safe to exclude the line segment EFA' since this would entail a reduction in the output of other goods and services. Between C and E there are issues of the current trade

position in fish and in other goods, as well as the degree of fishing capacity to harvest the newly claimed endowment. Should it turn out that A is unable to take full advantage of the new entitlement, and country B is not allowed to harvest any fish from the extended jurisdiction, then country A has been made only slightly better off, while B has been made markedly worse off.

To simplify the analysis current and potential consumption, import and export magnitudes have been ignored. It is also possible to derive utility possibility frontiers for A and B from the various production loci. Our interest in this type of analysis lies in its ability to depict intercountry relationships in a fishery when there is a unilateral change in entitlements. The recent confrontation between England and Iceland over fishing access is an interesting example of two countries with drastically different production possibility frontiers between fish and other goods; the tenacity with which Iceland resisted British fishing activity tells us something of the marginal rate of transformation of fish for other goods in Iceland.

IV. DISTRIBUTION IN THE DOMESTIC SETTING

> Since the allocation of permits is, in essence, a matter concerning the distribution of wealth, it will inevitably become controversial and difficult. 'Who <u>should</u> get licenses' is not an issue on which economists have much to say. It is rather, a matter for negotiation among fishermen and administrators (Francis Christy, 1977, p. 150).

The above quote asserts that economists do not have much to say on who gets access to the fishery, yet one respected fishery economist has voiced contempt for the judges who awarded "50 percent of the salmon catch to less than 1 percent of the population (Crutchfield), 1977, p. 381)."

And, another economist who has worked extensively in the fishery says:

> Extended jurisdiction in itself solves very little. Used improperly, it exclusively reserves to the U.S. the right to squander its valuable capital and labor through the imposition of quotas to insure that fish are "saved". The way to repair the market failure is through the transformation of common property resources into private property resources. I see no one worried about the conservation of chickens, pigs, cows, or turkeys (Bell, 1977, p. 24).

This curious statement highlights the distributional quandary among fisheries economists. On the one hand we are told that the economists have nothing to say about who gets access, then we are told that returning--and I do emphasize returning--part of the salmon catch to the American Indians constitutes an outrage. Finally, we are told that the fish need to be converted into private property. But who's property? Obviously not the Indians if we listen to Jim Crutchfield; the highest bidder if we listen to Fred Bell and others. But are either efficiency or equity served by selling fishing access to the highest bidder? It depends upon how we define the highest bid.

Assume that the domestic portion of allowable catch has been determined and that there are three (homogeneous) groups of fishermen seeking permission to fish. The usual answer is to sell licenses or certificates to fishermen thus extracting some of the rent for the state--and insuring that those who value fishing the most would get in. In Table 1 I have depicted three groups of fishermen: (1) "commercial" fishermen (CF); (2) American Indians (AI); and (3) "marginal" fishermen (MF). Assume that both CF and AI are serious "full-time" fishermen, although there are important differences between their two operations. CF consists of heavily capitalized fishermen with the latest technology who catch great quantities of fish, but who incur

considerable cost; assume a net present value of access to the fishery of 105--this represents the maximum willingness to pay for CF. For AI, fishing is much more labor intensive, and while catch per unit of effort is lower than for CF, so are costs. Thus, we assume a net present value for access to the fishery of 100. As for MF, this group has neither the modern technology of CF, nor the skill of AI; this group is rather nonchalant about fishing and is capable of a variety of other work. Assume that the willingness to pay for access for this group is 60.

Now consider the alternative occupations for the individuals in these three groups. For CF, boats could be sold and we may assume that these individuals might fare rather well in non-fishing occupations. For AI we cannot assume that things would go so well; this group is not well suited to occupations other than the traditional one of fishing. Finally, as indicated, those in MF are moderately adept at finding alternative employment. The net present value of these groups in their best alternative is depicted in the second row of Table 1.

The final row in Table 1 shows the difference in net present value for each group between fishing and their assumed best alternative--it is the opportunity cost to them, and to the nation, of being denied access to the fishery.

Now, in the design of fishery management schemes the issue of <u>who gets what</u> may be analyzed by answering the question: of those who might gain access to the fishery, which group would enhance national income the most? If we assume that only one group is to gain access, then it is not so clear that that group with the highest net present value in the fishery would be the one which should have access on either efficiency or distributional grounds. In Figure 2 I have plotted the net present value of fishing activity against

TABLE 1

	CF	AI	MF
NPV_F	105	100	60
NPV_A	95	30	45
$NPV_F - NPV_A$	10	70	15

(Figures assume each group is alone in the fishery)

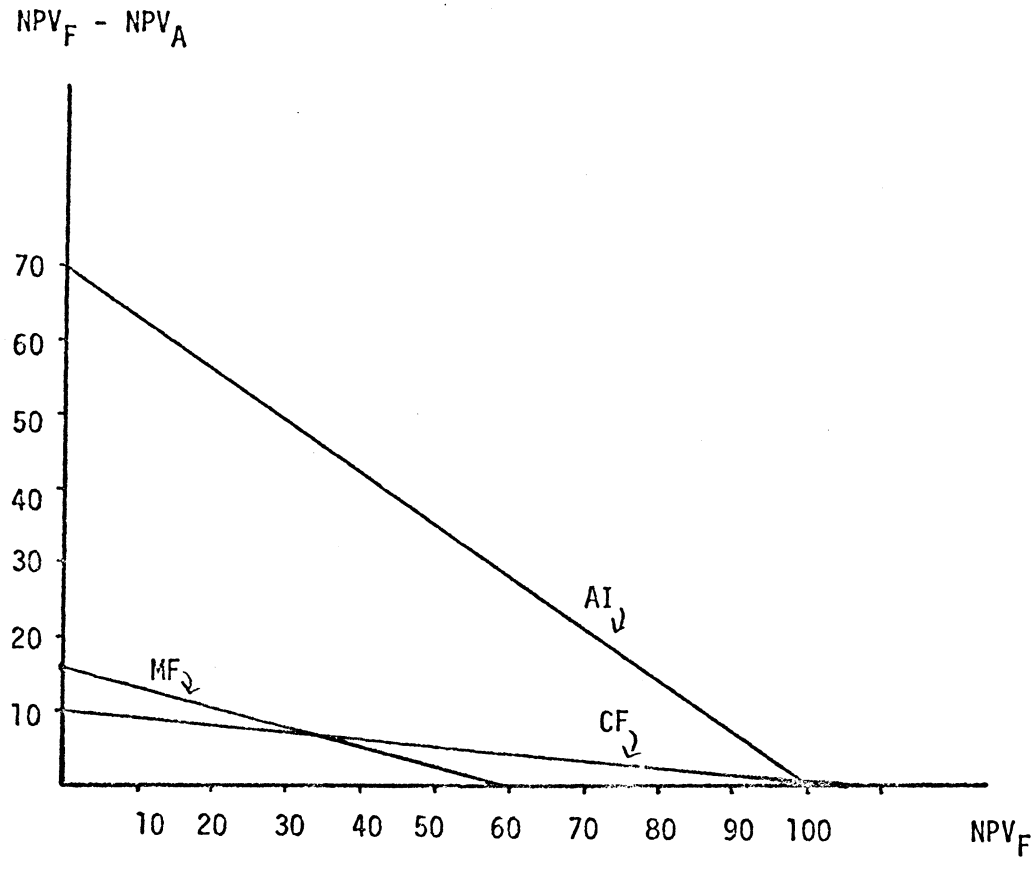
NPV_F - NPV_A
70
60
50
40
30
20
10
AI
MF
CF
10 20 30 40 50 60 70 80 90 100
NPV_F

FIGURE 2

the group opportunity cost of being denied access to the fishery. It is clear that group AI stands to lose the most by exclusion and aggregate present-valued income is enhanced if AI has access to the fishery, and the other two groups do not; here aggregate net present valued-income is 235 compared to 180 for CF in the fishery, and 185 for MF having access. Indeed, if we assume that the interaction effects are zero, and that it is possible for two groups to have access to the fishery, we see in this example that aggregate net present-valued income is highest if CF is denied access (NPV=95) while AI and MF are allowed in (100 + 60). Thus, the relevant figure for allocating limited access to the fishery is not--as we have been told so many times--the "rent to the resource." It is, instead, determined by a careful accounting of the alternative income earning potential of all petitioners seeking access.

On equity grounds, we might also question--again assuming that only one group can gain access to the fishery--the traditional result of giving access to the highest bidding group (CF) while relegating the other two groups to their alternative employment. While AI experiences a diminution of 70 percent by being denied access, and MF experiences a diminution of 25 percent, CF would suffer a diminution of less than 10 percent. Surely economists have quite a bit to say about who gains access to the fishery; it need not be classified as being merely concerned with "love".

V. POLICY AND RESEARCH IMPLICATIONS

Without condoning the territorial imperialism of the extended economic zone, I share with other economists the sense of optimism concerning the opportunity for improved fishery management. And yet I am worried that "Crutchfield's Complaint" (opening quote) may continue to find sympathy

among economists. Fishery economics and policy is concerned with the study of alternative institutions pertaining to who may fish, what technology will be employed, when and how fishing may occur, and what will happen to the harvest. These are matters which cannot be dealt with in an economic framework other than welfare economics; intellectual honesty will allow no other approach. I am sorry if welfare economics is not as "well behaved" as conventional price theory, or firm-optimization models. But there must be a more compelling reason to avoid appropriate economic models than the mere fact of intractability. It is indeed inconvenient for those economists who feel constrained to have quick advice for policy makers that welfare economics has a "nasty tendency to trail off into philosophy and inaction if pursued far enough." But is the correct response to thus ignore welfare theory and its distributional imperative?

We cannot overlook the fact that the big gainers and losers of any management scheme will be the fishermen themselves. One need only look at the livestock industry in the West--where access to public grazing lands is so crucial--to appreciate the devastating long-run economic loss of those who were not so fortunate as to gain access; efficiency issues pale in comparison to the distributional ones. Entitlements to a resource are the key to policy-relevant analysis. When a certain subset of those who currently have access sit on planning bodies designing management schemes--including gear type, vessel size, total annual catch--it doesn't take much intuition to begin to understand "whose ox is being gored."[2] And when a large contingent of politically aware sport fishermen take on a few commercial fishermen it is not difficult to imagine who will win. Surely economics has something to offer in this important policy issue.

In the few pages allotted me I have tried to offer several suggestions for beginning to introduce distributional considerations into the analysis of both international and domestic fisheries policy. I have no illusions that it will be simple, but I reject the notion that we should press the economic management of fisheries "as far as possible on allocative or efficiency criteria before modification if absolutely necessary, by equitable or distributional criteria (Scott, 1977, p. 410)."

On the domestic front, a distributionally related management program would begin by paying careful attention to the real mobility (both monetarily and non-monetarily) of all who would seek access. We have talked for too long of managing fisheries for the greatest economic benefit to the resource rather than for the economic benefit of the nation; this latter concept includes those involved in the fishery as well as those precluded from involvement. I am continually surprised at the cavalier way in which some economists can talk of denying access to the fishery. My friend, Jim Crutchfield, approvingly discusses the situation in the State of Washington by saying: "...the drive for a limited entry program that severely restricts effort is coming from an industry group rather than the preachings of academic people (1977, p. 384)." Yet, where do we suppose industry groups get the imprimatur for making others worse off so that they (those in the fishery, organized, and probably more "successful") can be made better off? Could it be from "academic preachings" which refer to this redistributional approach only in terms of achieving efficiency in resource use?

Moreover, the move toward limited entry is often dismissed as being of minor harm--and far outweighed by the good resource allocation implications: "While it (limiting entry) may confer unearned windfalls initially, once those rights become established as transferable property their price thereafter will pretty well limit the rate of return to new entrants to a com-

petitive level, and allocative benefits will be realized. There will be a desirable tendency for those permits to gravitate to those who can use them efficiently and professionally. The negative impact will occur only in a once and for all fashion (Crutchfield, 1977, p. 385)(emphasis added).

I suspect that Crutchfield's apparent outrage at 50 percent of the salmon catch being allocated to the Northwest Indians is based on the fact that they are: (1) not "efficient and professional"; and (2) that they are probably disinclined to treat the rights of access as "transferable property" which would someday gravitate to those who are professional and efficient.

And yet, distributional analysis is concerned precisely with who gets what. We cannot be so casual about the fact that the negative impacts are merely of the "once and for all variety"--access denied is precisely that, and while our value judgements about who should get access are immaterial, we do have an analytical interest in the process whereby some obtain access and some don't.

We should be able to build models of the differential level and incidence of transaction costs which are relevant to the sort of subtle (and often non-subtle) bargining about who gets what. We should be able to build models of international comparative advantage which would be helpful in understanding the opportunity cost to various nations of denying them access to our extended economic zone. We should be able to disaggregate "fishing effort" into its component parts so that we don't continually beguile ourselves into thinking that it is some homogeneous and standard input. And we should be able to build fishery models which somehow recognize that there are individuals of a wide variety of skills and capital equipment in the fishery, and with a wide disparity of economic opportunity outside of the fishery. We must remember that the optimal way to manage the fishery is as an intergrated industry with all others. It is nonesense to manage

fisheries for the maximum economic benefit to the resource. If we make the political decision not to exterminate any fish stocks, then economic theory tells us to manage that small segment of our extractive resource base for the greatest possible benefit of all of us. As unhandy as it may turn out to be, this is what welfare economics is about.

FOOTNOTES

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[1]For two excellent treatments of the international fishery see Anderson, 1977b, and Southey 1971.

[2]In Wisconsin's Lake Superior fishery access is constrained by: (1) a $10,000 investment; (2) $5,000 of annual (historical) catch; and (3) at least 75 days of fishing per year.

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Comment by

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on

DISTRIBUTIONAL IMPLICATIONS OF THE EXTENDED ECONOMIC ZONE: SOME POLICY AND RESEARCH ISSUES IN THE FISHERY

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We heartily applaud Dan Bromley's paper. As expected, it is provocative. We agree with his premise that: "there are important insights to be gained by breaking out of the traditional steady-state/yield-effort models and viewing the economics of extended jurisdiction in a welfare theoretic framework." However, we are concerned with two particular aspects of the paper.

In breaking away from steady-state/yield-effort models, Bromley appears to go beyond the identification of distributional consequences of fishery policy and prescribes fishery policy because of distributional consequences. Economists employ theoretical constructs to predict policy consequences. Theoretical constructs do not prescribe policy "for the greatest possible benefit of all of us." Economists must doff their economists' hats to prescribe policy. Bromley does not tell us when he is wearing his economist's hat and when he is wearing his manager's hat (nor do Crutchfield or Bell, as quoted in Bromley's paper.) We prefer a clearer distinction between welfare theory's ability to (a) provide policy prescriptions (normative) and (b) predict policy consequences (positive).

Our second concern relates to the role of distribution in welfare theory. Bromley argues that efficiency (or maximum net economic rent)

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is only one socially relevant variable. We agree. He then introduces distributional considerations. Does this imply that distribution is another socially relevant variable, or is distribution another dimension of efficiency?

If distribution is another socially relevant variable, are there not many more that deserve consideration? The Fishery Conservation and Management Act of 1976 contains an extensive list of socially relevant variables. Our own experience suggests that fishery participants would rank efficiency (and distribution) fairly low on their list of socially relevant variables.

If distribution is another dimension of efficiency (as implied in Bromley's discussion of "access") what of the distributional dimension of the other socially relevant variables? We suspect that the current controversy over allocation of fish (or fishing rights) has less to do with the distribution of net economic rent and more to do with the distribution of the other socially relevant variables. In attempting to substitute the net economic rent criteria for the maximum sustainable yield criteria, economists have exposed themselves to the same criticisms leveled at fishing biologists. Our model is still incomplete.

Fortunately, the new management regime created by the Fishery Management and Conservation Act of 1976 provides for public hearings where potential gainers and losers can not only identify socially relevant variables, but can express priorities for distribution.

In Section II Bromley emphasizes that fishing families are "not mere pounds of fertilizer, acre feet of water or tons of bauxite." We find it unfortunate that he dismisses, by implication, the rewards accruing to owners of the fertilizer, water and bauxite, who may also

have families.

The international model presented in Section III appears to have a variety of interesting applications. For example, it might be used to predict the reaction of Japan (i.e., Country B) to the current management policies under the U.S. (Country A) Fishery Conservation and Management Act of 1976.

In contrast to Bromley's example, fish (does "fish" in Bromley's model refer to stocks or production?) are not unilaterally expropriated but are initially allocated between Countries A and B roughly in accordance with the status quo. Also in contrast to Bromley's example, management does not shift production possibility curves. However, we would expect the production possibility curve of Country A to shift outward in the direction of F since perceived risk (and therefore cost) is reduced by the very existence of the Fishery Conservation and Management Act of 1976.

We face a dilemma in predicting the eventual allocation of fish between Countries A and B. Bromley implies that the beginning allocation of fish, FB to Country B and FA to Country A, is less than optimum for Country A and optimum for Country B. The optimum for Country B appears as a tangency point equating marginal costs to price ratios. Unilateral fishery policy by Country A will presumably allow it to achieve a similar tangency (or internal equilibrium.) But doesn't that tangency represent maximum efficiency, the very single-dimension criterion which Bromley decries?

The eventual allocation of fish between Countries A and B will then depend upon the new Country A production possibility curve location and the management criterion used in determining tangency. With the quota

approach to allocation, Country B's production possibility curve will be discontinuous at the quota level. A situation requiring extreme Country B measures to accomplish some internal equilibrium (such as joint ventures with Country A fishing firms, aggressive buying of Country A inventories, influence peddling, etc.)

Bromley's Table 1 example in Section IV is a little confusing. Is $NPV_F - NPV_A$ row a vector of "rents"? If so, won't maximizing this rent to the resource come about through the bidding process by which the highest bid comes from group AI and the lowest from group CF? It seems to us that rents can be determined only after consideration of alternative income sources.

The meaning of net present value is not clear. Does "net" mean "receipts less all costs?" If so, NPV_A is already accounted for in the NPV_F row and $NPV_F - NPV_A$ has no relevance.

Bromley's point is nevertheless well taken; opportunity costs of participants must be properly accounted for.

In conclusion, we would have preferred a little more caution in the prescriptive use of welfare theory and a clearer interpretation of the role of distribution in welfare theory. We are still very much in sympathy with Bromley's desire to break out of the traditional steady-state/yield-effort model. However, let's not stop at distributional considerations, let's give some attention to other socially relevant variables in fisheries policy research.