INSTITUTIONAL MECHANISMS FOR DEALING WITH INTERNATIONAL EXTERNALITIES: A PUBLIC CHOICE PERSPECTIVE

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Our paper is probably the most theoretical paper prepared for this conference. Since our background is primarily in economics, our major objective is to illustrate how economics can be useful in the study of the law of the sea negotiations.[1] Our purpose is not so much to talk about law of the sea specifically as it is to illustrate how concepts from the economics of public finance and public choice can be useful in analyzing the types of problems that have emerged in the law of the sea negotiations (certainly one of the most complex international negotiations ever to take place). We do, however, apply our approach to several specific issues in these negotiations, including ocean resource exploitation, ocean pollution, and the concept of the oceans as the common heritage of mankind. The general theme of our remarks will be that, given the difficulties of reaching international agreement, it would seem wise to concentrate efforts at international agreement on those areas in which agreements can make the greatest contribution. To do this, of course, it would be necessary to determine the relative difficulty of achieving agreement in the various areas. We specifically address ourselves to three broad questions concerning the negotiations.

In the first section we look at the relevant trade-offs involved in designing policies and institutions to internalize international externalities. For our purposes here, we define an externality as the uncompensated side effects (positive or negative) of an activity on parties not directly involved in the transaction. An example of a prominent externality in the law of the sea negotiations is ocean pollution, where shippers and consumers of products dependent upon ocean shipping for transportation pose a potential externality to the quality of the marine environment. We stress in this section that the mere existence of an international externality does not lead to the conclusion that it should be internalized at the highest level of government possible. Thus, it is particularly important to recognize that merely showing that the market is failing to perform perfectly or that there

[1] We emphasize, however, that ours is a public choice perspective. In this paper this means the application of economic analysis to decipher what the substantive political and economic aspects of various issues are. Methodologically, then, we are situated between economics and political science and will hopefully have some things to say that will be useful to policy makers and scholars in both areas. For a more extensive discussion of the theory of public choice, see J. M. Buchanan and R. D. Tollison, eds., *Theory of Public Choice* (Ann Arbor: University of Michigan Press, 1972).

is some scope for gain from coordination of national policies is not sufficient to establish a clear case for international action. The need for caution in taking market or national government failure as a prima facie case for international intervention is reinforced by the recognition, derived essentially from contributions to the theory of public choice, that "perfect intervention" by governments or international organizations is as rare as the "perfect competition" of economists' models in real economic systems. Likewise, even where some degree of externality is imposed upon the whole community of nations, if the significant portion of the externality is concentrated on a smaller number of countries, then in an imperfect world, it may be more desirable for attempts at international action to be concentrated on this smaller number of countries. The issues here correspond closely to those of desirable patterns of fiscal federalism within a nation-state. Our general conclusion in this section is that not every externality needs an international body to deal with it. Since governments are not perfect intervenors, one must look at the relevant trade-offs in externality control in each case.

This approach is applied within the context of specific issues in the current international negotiations on the law of the sea. Specifically, we examine first the potential externalities from the exploitation of ocean resources, and conclude that there is no economic rationale for the international regulation of deep-ocean economic activity, except for the specific case of fish that reside primarily in international waters. Second, we examine oil pollution control, including the externalities that can arise from the harmonization of pollution standards. Our basic conclusion in this discussion is that the costs of not having internationally agreed upon pollution standards have been generally overstated relative to the benefits.

In the second section of the paper we discuss the concept of the oceans as the common heritage of mankind. It has appeared to many observers that acceptance of this concept requires the creation of an international regulatory authority to control access to ocean resources and to tax and control the operations of firms developing ocean resources. In this section we analyze the common heritage concept and derive from public finance and public choice principles an operational formulation of it consistent with liberal economic principles.

In the third section we extend the discussion of the law of the sea negotiations to consider questions bearing on the process of the negotiations as such. We argue that the prospective gains from international action must be weighed against the costs of securing international agreement and the potential diversion of scarce collective decision-making resources from other more important areas. We specifically examine the effect that the number and complexity of issues can have on negotiations. In particular we stress the importance of not having too many issues in the same negotiating forum and relate this point to the slow rate of

progress in the law of the sea negotiations. We also stress the importance of agenda setting in determining collective outcomes.

Our main conclusions in this section are twofold. First, we argue that there is a strong theoretical case for weighted voting in international organizations and agreements, although such voting systems are often hard to implement in practice. Second, we conclude that there is a strong case for including more than one issue in a set of negotiations so as to allow greater scope for compromises which are technically efficient. As the number of issues increases, however, the difficulty of discovering and implementing technically efficient solutions may also increase. Thus, where information costs exist, it is possible to go too far in increasing the number of issues dealt with in a particular forum. It seems possible that in the current comprehensive law of the sea negotiations, the number of issues may have been pushed past the point of optimum trade-off.

Fiscal Federalism and the Control of International Externalities

A methodological error often made in discussions of public policy is to assume that market failure automatically implies government intervention. But this unexamined alternative, too, produces externalities and is clearly not a perfect remedy for private market failures. In the context of the law of the sea negotiations, this fallacy frequently leads to the assumption that market failures should be internalized at the highest possible level of international agreement (the United Nations). Although economists should make this mistake less readily than others, the economics profession is somewhat to blame for engendering the general idea that the simple application of Pigovian taxes and subsidies is a cure-all for market failure. In recent years, however, such writers as Buchanan, Coase, and McKean have pointed up some of the problems with the simple Pigovian logic.[2] At the international level it can, in particular, obscure many of the advantages of bilateral and regional agreements to control externalities, and in a broad sense it simply ignores the costs of lost diversity where the amount of externality control desired varies widely among individual nations. In this section we first review briefly the basic trade-offs mentioned in the economic theory of fiscal federalism for determining the optimal level at which to regulate market failures, and then explore the problems in applying this approach by looking at the technical aspects of selected law of the sea issues.

[2] See, for example, J. M. Buchanan, "Politics, Policy, and the Pigovian Margins," *Economica*, n.s. 29 (February 1962), pp. 17-28; Ronald Coase, "The Problem of Social Cost," *Journal of Law and Economics*, vol. 3 (1960), pp. 1-44; and R. N. McKean and J. R. Minasian, "On Achieving Pareto Optimality: Regardless of Cost," *Western Economic Journal*, vol. 5 (December 1966), pp. 14-23. Pigou, however, has some modern defenders. See, for example, W. J. Baumol, "On Taxation and the Control of Externalities," *American Economic Review*, vol. 62 (June 1972), pp. 307-22.

The economic theory of fiscal federalism stresses the determination of the optimal size of polities and is based on the principle of perfect correspondence. Perfect correspondence occurs when the jurisdiction that provides the public good or regulates the public bad includes the entire set of homogeneous individuals who consume the good or bad, and only these individuals.[3] This, however, is clearly a limiting case. In a more realistic case of international externality, benefits or costs taper off spatially from some point of origin and are not spread equally among the members of a given polity.[4] This type of benefit or cost incidence makes it important to look at the technical aspects of particular externality problems in determining the relevant level of government to regulate the externality. Rigid application of perfect correspondence in this setting could lead to the determination of the consumption levels of most public goods at an extremely centralized level with a subsequent loss in the advantages of decentralized provision of these goods.

In practice the application of the correspondence principle suggests that one should equate the marginal costs and benefits from expanding the number of individuals in the relevant jurisdiction. Many trade-offs are possible in arriving at the optimal jurisdiction size. Among those treated in the literature are diversity in individual demands (that is, the decentralization theorem),[5] costs of collective decision making,[6] consumer mobility,[7] governmental interdependence,[8] and, in an explicitly normative model, the equality of total utility over the issue set among the members of a polity (that is, the equal-stake requirement).[9] The decentralization theorem emphasizes the optimality of local public-goods supply where there is a geographic diversity of individual demands for the good and there are no cost

[3] For definition see Wallace E. Oates, *Fiscal Federalism* (New York: Harcourt Brace Jovanovich, Inc., 1972), pp. 33-35. Also, see the discussion in Richard A. Musgrave, *Fiscal Systems* (New Haven: Yale University Press, 1969), pp. 292-320.

[4] See Musgrave, *Fiscal Systems*, p. 296, for a clear discussion of the problem posed to the theory of fiscal federalism by tapering benefits and costs.

[5] See Gordon Tullock, "Social Cost and Government Action," *American Economic Review*, vol. 59 (May 1969), pp. 189-97; and Yoram Barzel, "Two Propositions on the Optimum Level of Producing Public Goods," *Public Choice*, vol. 6 (Spring 1969), pp. 31-37.

[6] See Gordon Tullock, "Federalism: Problems of Scale," *Public Choice*, vol. 6 (Spring 1969), pp. 19-29.

[7] See Charles M. Tiebout, "A Pure Theory of Local Expenditures," *Journal of Political Economy*, vol. 64 (October 1956), pp. 416-24, and "An Economic Theory of Fiscal Decentralization," *Public Finances: Needs, Sources, and Utilization*, ed. James M. Buchanan (Princeton, N.J.: Princeton University Press, 1961), pp. 79-96; James M. Buchanan and Richard Wagner, "An Efficiency Basis for Federal Fiscal Equalization," in *The Analysis of Public Output*, ed. Julius Margolis (New York: Columbia University Press, 1970), pp. 139-58; and James M. Buchanan and Charles J. Goetz, "Efficiency Limits of Fiscal Mobility: An Assessment of the Tiebout Model," *Public Economics*, vol. 1 (April 1972), pp. 25-44.

[8] See Gordon Tullock, "Federalism: Problems of Scale." Also, see Mark V. Pauly, "Optimality, 'Public' Goods, and Local Governments: A General Theoretical Analysis," *Journal of Political Economy*, vol. 78, no. 3 (May/June 1970), pp. 572-85, and the references cited there.

[9] See Dennis C. Mueller, "Fiscal Federalism in a Constitutional Democracy," *Public Policy*, vol. 19 (Fall 1971), pp. 567-94.

advantages to centralized provision of the public good. In effect this argument suggests that the incentives for decentralization are likely to be greatest where the diversity in local demand is considerable. The trade-off involving the costs of collective decision making is especially important in the law of the sea negotiations, and we shall have more to say about it later in the paper. In short, there are administrative and voting costs to having multiple decision-making entities. Consumer or voter mobility causes special problems. In some respects mobility increases the gains from decentralized decision making, because consumer-voters may locate as a function of their preferences for mixes of private and public goods. On the other hand, where such factors as congestion costs become important, mobility can be a mixed blessing to consumer-voters already living in a given polity. Governmental interdependence stresses the problems covered by externalities that occur across jurisdictional boundaries. This trade-off suggests decision making on a more centralized scale than purely local supply. Finally, the equal-stake requirement emphasizes the requirement that voting rights should be tailored to individual stakes in a collective decision. We shall also have more to say about this potential trade-off later in the paper.

A broad trade-off that we particularly wish to emphasize at the international level is that between diversity in individual (national) demands for the control of international externalities, and centralized procedures to internalize international social costs and benefits. If we take the economist's view of optimality as tailoring economic outcomes to fit individual preferences as closely as possible, then decentralized provision of public goods will typically be more efficient unless centralized provision has some inherent cost-saving advantages.

There has been a tendency in the literature to assume that efficiency in externality control requires the same tax-price for all communities.[10] This does not necessarily follow, and as stressed by the decentralization theorem, where people have different tastes, fiscal mechanisms should be tailored to reflect this diversity.[11] Much of this discussion centers on the question of factor mobility, stressing that where factors are immobile different tax-prices will be optimal. Even in the case of factor mobility, different tax-prices will still be optimal where the costs of mobility are properly accounted for. Mobility does, however, cause some special problems. Competition among local communities can lead to undercutting of tax prices to control local externalities to secure local industry. This is more likely to be a problem where the local competition takes the form of bidding for tax havens (such as the location of head offices or the registry of a ship) than in

[10] See, for example, J. Stein, "The 1971 Report of the President's Council of Economic Advisers: Micro-Economic Aspects of Public Policy," *American Economic Review*, vol. 61, no. 6 (September 1971), pp. 531-37.

[11] For a suggestive treatment of a specific example, see R. C. Amacher, R. D. Tollison, and T. D. Willett, "The Economics of Fatal Mistakes: Fiscal Mechanisms for Preserving Endangered Predators," *Public Policy*, vol. 20 (Summer 1972), pp. 411-41.

the case of industrial pollution. In domestic economies, as Sherman and Willett stress, there can be a problem (though usually overrated) of lowering pollution standards to bid for industry when there are local employment benefits.[12] This is probably more of a problem within regions, however, than among countries. Within regions substantial employment effects may develop from factor mobility because of resultant changes in aggregate demand. Among countries, however, where exchange rates can change, there may be sectoral impacts of industrial relocation, but there would be no problem of deficient effective demand causing additional long-run unemployment. We discuss this issue in more detail later in this section.

Of course, in practice the choice between diversity and centralized control of externalities is not so simple. For example, in the derivation of correspondence the spatial patterns of benefits and costs from the provision of the public good (or bad) are assumed to be contained in the jurisdiction that provides the good. As stressed above, a more realistic case is one in which benefits or costs taper off spatially with increasing distance from a point of origin.[13] This type of benefit or cost incidence can lead to interjurisdictional externalities, because jurisdictional lines, derived from considering the trade-offs noted above, will typically not coincide with the area of benefit or cost incidence. In this case it is important to find mechanisms that allow optimal control of externalities while maintaining as much diversity in individual demands as possible. In other words, most practical applications of the correspondence principle would lead to consideration of the trade-offs among the various costs and benefits of greater conformity. The main point here is that it is inconceivable that we would want to internalize every spillover of costs or benefits among nations at the international level. In any approach to international externalities emphasizing diversity, schemes of optimal control will emphasize the importance of choosing the optimal level of decision making on the issue.

It is especially important to note that while this complication of tapering benefit or cost incidence can be solved by applying a varying benefit tax (as stressed by Musgrave), it is difficult to conceive of a solution in terms of a workable voting system. Capricious outcomes can result where individuals with small interests in a spillover problem are given a full vote in the determination of the outcome. This sort of structure of voting rights can lead to intensity problems, where voting may not maximize social welfare. That is, partial taxation and equally weighted voting rights for tapering externalities can lead to capricious results.

Intensity problems have been much discussed in the literature on voting theory.[14] The typical statement of the problem depicts the victory of a lethargic

[12] See R. Sherman and T. Willett, "Regional Development, Externalities and Tax-Subsidy Combinations," *National Tax Journal*, June 1969, pp. 102-23.

[13] See Musgrave, *Fiscal Systems*.

[14] For a discussion emphasizing that no solution exists for intensity problems, see R. Dahl, *A Preface to Democratic Theory* (Chicago: University of Chicago Press, 1956).

majority over an intense minority, to the detriment of either one's sense of equity or efficiency. One of the simplest of all democratic processes illustrates one type of intensity problem: a local referendum to increase the property tax by a stated amount and use the funds to build a new school. This situation can easily lend itself to an intensity problem. For example, a majority of the voters may not have children and may be slightly opposed to the measure because of the (let us say) small tax increase that accompanies it. The parents of school-age children may be intensely in favor of the tax-school package, however, because of the poor condition of the existing school. Thus, the parents would lose to a relatively indifferent majority in the defeat of the school issue. Conversely, one could envisage a situation in which the parents are in the majority, the proposed tax increase is substantial, the present school is in good condition, and the nonparents are "tyrannized" by the passage of the tax-school referendum. In either case the lesson is clear—for one-man-one-vote majority rule on separate issues to have normative authority, each voter must have an equal expected welfare gain or loss from the outcome of any given issue. We have addressed this type of problem in a separate paper stressing that weighted voting where voting rights are tailored to individual stakes in spillovers is the appropriate voting analog to the varying benefit tax.[15] While we do not wish to go into the theoretical justification for this voting analog here, we do wish to emphasize the general desirability of tailoring voting processes to reflect voters' stakes in issues. In the case of the law of sea, the application of this type of voting model would stress weighted voting rights where issues are decided at the highest level; it would also argue for more decentralized decision making on externality issues that affect smaller subsets of United Nations members.

To conclude this brief discussion we wish to emphasize that it is crucial to analyze specific externality problems with respect to the basic trade-offs involved in deciding at what level they should be handled. Basic questions that must be addressed would be: (1) the nature of the externality—does it exist, is it worth the cost of doing something about it, and over what domain does it occur; and

[15] See our "A Voting Mechanism for Fiscal Federalism where Spillovers Taper Off Spatially," unpublished manuscript, Cornell University, 1973. For further discussion and theoretical justifications of the type of voting sytem presented in the text, see Mueller's "Fiscal Federalism" and the following papers by Dennis C. Mueller, Robert D. Tollison, and Thomas D. Willett: "A Normative Theory of Representative Democracy," in *Democratic Representation and Apportionment: Quantitative Methods, Measures, and Criteria*, Annals of the New York Academy of Science, vol. 219 (9 November 1973), pp. 5-19; "Representative Democracy via Random Selection," *Public Choice*, vol. 12 (Spring 1972), pp. 57-68; "On Equalizing the Distribution of Political Income," *Journal of Political Economy*, vol. 82 (March 1974), pp. 414-22; "The Utilitarian Contract: A Generalization of Rawls' Theory of Justice," *Theory and Decision*, vol. 4, no. 3, pp. 345-69; "Solving the Intensity Problem in Representative Democracy," in *The Economic Approach to Social Policy*, R. C. Amacher, R. D. Tollison and T. D. Willett, eds. (Ithaca: Cornell University Press, forthcoming). Also, see Dennis C. Mueller, "Constitutional Democracy and Social Welfare," *Quarterly Journal of Economics*, vol. 87 (February 1972), pp. 60-80.

(2) the efficiency of organizations designed to deal with the spillover. It is possible that some of the externalities at issue in the law of the sea negotiations, when subjected to this sort of technical analysis, would appear to be best handled by bilateral or regional agreements at a far more decentralized level of decision making than a conference of United Nations members, each with a full vote on all issues. In the remainder of this section we examine the technical aspects and trade-offs of several law of the sea externality issues.

Regulation of Ocean Resource Exploitation [16]

Three resources that have received much interest in the law of the sea negotiations are fish, oil, and manganese nodules. The feeling is widespread that serious inefficiency is likely to result if these resources are not subjected to international regulation. In part, this feeling arises from the well-known difficulties fish and oil encounter because of the common-pool problem. This is a particularly timely question, since two major issues in law of the sea negotiations are an International Seabed Resource Authority (ISRA) to regulate the deep seabed (manganese nodules will be the major resource here in the near term) and international commissions to regulate fish species that are highly migratory (such as tuna) or spend their lives partly in fresh water and partly far at sea (that is, anadromous species such as salmon).

In the case of certain resources that have common-pool properties, competitive private market activity may lead to inefficient resource usage. These common-pool features of resource exploitation may create divergences between private and social costs and benefits, that is, externalities, and in the face of resulting "market failure," some form of collective agreement among producers or government action may be called for in order to achieve a fully efficient outcome.[17]

[16] The discussion considered under this heading is based on a larger study by R. J. Sweeney, R. D. Tollison, and T. D. Willett, "Market Failure, the Common-Pool Problem, and Ocean Resource Exploitation," *Journal of Law and Economics*, vol. 17, no. 1 (April 1974), pp. 179-92.

[17] It should also be noted at the outset that the characteristic of nonreproducibility of resources is not analogous to the common-pool problem and does not give rise to a divergence between private and social costs. Indeed, one of the two major subsets of the general common-pool problem is the effect of the stock of resources on their rate of reproduction. Arguments that unregulated market activity will lead to too rapid a depletion of nonrenewable resources are based on a belief that the market system generally has not led to correct investment and production decisions because private decision makers have failed to use socially appropriate discount rates. There is not a unanimity of views within the economic profession as to whether or not there is substance to this argument. Divergent views on this subject have been expressed in the literature on growth as an objective of government policy and in the partially related literature on the appropriate discount rate to be used in government decision making. It must be recognized that the contrary point of view requires government policies to influence rates of investment and exploitation to achieve economic efficiency and does not imply that ocean resources be singled out for special treatment. In other words, whatever general tax incentives or other measures are deemed desirable should be applied to firms operating in the ocean as well as within domestic economies. There is no economic case for applying special measures to ocean resource exploitation on these grounds.

The fundamental cause of any common-pool problem is the difficulty of identifying, keeping track of, and asserting property rights over some part of the resource in question. As a consequence, each person with access to the resource has an incentive to exploit currently as much as he profitably can, thus neglecting the effects of his actions on resource availability in the future, since he cannot hope to reap the future benefits that would result if he were to forgo some current profit. This neglect of the future leads to excessive rates of exploitation of fish and oil under competitive conditions. The fisherman who lets a fish go has no very great chance of catching it (and its offspring) later when it is larger (and has bred). Some other fisherman gets the benefit of this provision for the future, so the first fisherman has no incentive to let the fish go. The oil producer in a given pool who moderates his current flow risks allowing other producers to pump oil he could have had, and since each producer in the pool understands this, all pump too rapidly.

Fish and oil each add particular new elements to the general common-pool problem, since the future stock of fish depends on current harvesting, and the *efficiency* of pumping oil, as well as the quantity derived from pumping, depend on others' acts. But, to repeat, the common-pool problem turns crucially on the difficulty of identifying, keeping track of, and assigning property rights over a resource, and this difficulty is perhaps why these resources are generally treated as common property, whose ownership is established by seizure because it is not feasible to establish property rights in advance.

The absence of property rights in nodules might suggest by analogy that nodules could be subject to the "common-pool" problem that arises in fisheries and oil production precisely because of lack of property rights. This, however, is not the case. Nodules are not like fish since they do not move around and since apparently the reproduction rate of nodules is *independent* of the total stock of nodules.[18] Nodules are not like oil in that they do not flow from one mining site to another, that is, the action of one dredge head does not interfere with that of another. Thus, the externalities inherent in the common-pool problems caused by fish and oil do not apply to nodules.

This basic economic analysis suggests that there is no rationale based on the economic theory of the common-pool problem for regulating ocean mining. In the case of oil it seems sensible to suggest that since the relevant externality extends only over a given oil pool, producers will have sufficient incentives to reach

[18] To be exactly accurate, it should be noted that there is some dispute among geologists about whether there is a stock-reproduction process among nodules. However, if it exists, this process has a very small effect on nodule production, and from an economic point of view, there would not have to be a single owner of nodules to internalize the small external effects of such a reproduction process. Indeed, probable mining-plot sizes are large enough so that dispersed ownership of nodule sites could internalize this effect. The appropriate analog in fishing would be that of many private owners of catfish farms, where the problem of the net reproduction rate of catfish is handled appropriately by market decisions.

collective agreements to internalize these spillovers. And since oil pools are localized, even where called for, government intervention should be on the national or local level, rather than on the international level.

Finally, in the case of fish there is a clear rationale for international regulation of some species. Highly migratory species, such as tuna, that swim through many national waters do call for international regulation as a first, best solution.[19] Species that live in the ocean but stay in particular national waters are not candidates for international regulation, but in terms of the domain of the relevant common-pool problem are candidates for some form of national fishery regulation.

As this abbreviated discussion of ocean resources suggests, it is helpful to analyze the substantive aspects of any proposed externality problem to be sure that it exists and that some form of regulation is called for. For one thing, such analysis points up clearly that the absence of such regulation will not lead to chaos in ocean mining. The definition and protection of property rights should be sufficient to ensure efficient and orderly production in ocean mining. The alleged case of externalities associated with nodule mining was shown not to be significant, and hence ocean mining should not be a candidate for regulation on these grounds. Recognition of the importance of discovering the domain of international spillovers can therefore be quite useful in framing sensible negotiating positions on such issues.

In closing this discussion we should note that two potential cases of market failure caused by problems of defining and enforcing property rights which might affect nodule production are pollution and claim-jumping among sites of production. In the former case, the problem of pollution, for which enforcement costs are not excessive, is probably most efficiently handled by the assignment of liability to ocean producers for the costs of any excessive environmental degradation which they may cause. We discuss this problem in the next section. Claim-jumping, on the other hand, is a problem of property rights. Investigation of the factors which are likely to promote or deter claim-jumping suggests, however, that the nodule mining industry is not likely to display the type of claim-jumping behavior that was prevalent in the Old West.[20]

Thus, while clear delineation of property rights through a mechanism such as the U.S. proposal for licensing would be desirable, the absence of such a regime would not be likely to generate serious economic inefficiencies, at least until the number of mining operations begins to approach the number of prime mine sights, a development that is unlikely to occur during this century.

[19] It should be noted that the analysis only shows that government action *could* improve the competitive market performance. A badly regulated fisheries system could, of course, perform less well than an imperfect, unregulated market. The conclusion that some form of government regulation, either national or international, may help matters in commercial fishing is discussed extensively in the literature on the fishery.

[20] See Sweeney, Tollison, and Willett, "Market Failure, the Common-Pool Problem, and Ocean Resource Exploitation."

In summary, while fears have often been expressed that economic chaos would result from the failure of a comprehensive law of the sea treaty, economic analysis suggests that this would not be the case. In the case of mineral resources there is no economic case for international regulation, and while an international claims registry to establish property rights (by auction in the case of competing claims, as the United States has proposed) would be desirable, failure to establish such a mechanism would not be likely to lead to severely adverse economic effects. Economic analysis does suggest that there is a case for international agreements to preserve stocks of fish that reside in international waters.

Any number of analysts have asserted that if a comprehensive law of the sea treaty is not developed, the world will be plunged into chaos.[21] The presumption clearly is that if a broad multilateral agreement over the jurisdictional issues being considered in the law of the sea treaty cannot be achieved, there will be no incentive for nations to make bilateral arrangements among themselves or to work within the limits of existing international law, seeking opinions from the World Court whenever issues arise that are unprecedented in extant international law. Without in any way denigrating the desirability of reaching a good law of the sea treaty, we must point out that it is very disappointing, as a matter of analysis, to see how frequently chaos, or perhaps war, among nations over resource privileges is depicted as the only alternative to a multilateral law of the sea treaty. Such a view overlooks the fact that there is a wide array of alternative approaches to the preservation of economic and political order. In many instances, the conflicts and inefficiencies caused by the absence of an international regime may be minimal or nonexistent. In cases where there is the greatest need for international agreements, bilateral or regional arrangements may frequently form the basis for satisfactory outcomes, and in some instances may lead to more desirable results than would be achieved from broader multilateral agreement.

Given the various important aspects of arrangements for international fiscal federalism, there is no easy shorthand way for determining the appropriate institutional structure for internalizing international externalities, nor for ascertaining the costs of the absence of an international agreement. While economic, political, and public choice theory and the results of many studies of particular policies and organizations provide us with powerful aids in approaching these issues, particularly in suggesting pitfalls to avoid, these must be painstakingly applied to particular types of externalities and institutional alternatives on a case-by-case basis.

Many of those who predict "chaos without a comprehensive treaty" also tend to envision chaos unless all ocean activity is tightly regulated and heavily taxed, or indeed performed directly by an international organization. This view

[21] For example, see Patrick A. Mulloy, "Political Storm Signals over the Sea," *Natural History*, vol. 82, no. 6 (December 1973), pp. 87-90; Gregory De Sousa, "Ocean Management and World Order," *Columbia Journal of World Business*, Summer 1974, pp. 123-28; and a three-part series, "Chaos at Sea," in *Saturday Review World*, vol. 1, nos. 14-16 (November and December 1973).

is most often applied to living and nonliving resources, namely fisheries and minerals; but it is also applied to "resources of use" of the oceans, principally scientific research and freedom of navigation for ships. The argument is that without close international supervision and taxation of all of these resources, the benefits of exploiting them may accrue disproportionately to a single country, thus violating the "oceans as common heritage of all mankind" concept, which we discuss separately below.

Unfortunately, such tight controls or quite onerous tax burdens, if accepted, may only serve to heighten international tensions by inducing conflict; hence, they may be more likely to result in chaos than would the absence of any treaty. Of more immediate concern, however, is the fact that if rigid international control over many of the resources in question were introduced, it might be such a great deterrent to private ocean activity that no one would benefit except a few land-based producers of minerals whose gains would be exceeded by the losses of the rest of the world due to high prices.

Harmonization of Externality Control: The Case of Ocean Shipping

Another consideration of some importance in the law of the sea negotiations is that the measures used to control externalities may themselves generate other types of externalities. A good example of this is the case of shipping. Our impression is that the case for harmonization of shipping standards has been greatly overstated, but let us discuss the specific reasons why we feel this way.

Among the many issues involved in the law of the sea convention is the problem of establishing minimum international ocean pollution standards. The rationale supporting the view that there should be a single international standard is that standards which vary widely from the coastal areas of one state to another would cause large increases in the shipping costs of international trade since ships might have to travel substantially longer distances to avoid having to comply with the particularly stringent rules of a single coastal state bordering a trade route. Furthermore, ships from more pollution-tolerant states might gain an "unfair" competitive advantage over ships from states less tolerant of pollution.

The position that, without uniform international standards, chaotic shipping conditions would result is dubious. The proponents of single standards argue that without a single standard, in particular a vessel-design and construction standard, countries are likely to impose bizarre standards, and that there would be no effective means by which coastal states neighboring those with very lax standards would be able to control pollution coming from adjacent waters. The first argument is weakened by the recognition that countries which behave in their rational self-interest will not increase their own shipping costs substantially by imposing highly specialized pollution-reducing vessel construction standards. To

the extent that its standards are at wide variance with those of the rest of the world, a country's costs will increase more than proportionally. The second argument would be false if an effective liability system were established under which polluters would be made to bear the full cost of environmental repair.

By requiring owners and operators to build ships with highly effective pollution abatement capability, nations could achieve significant reductions in oil damage, but the cost of implementing this technology could exceed its benefits to society. Moreover, to the extent that different countries would prefer to make different trade-offs between pollution control and the availability of other goods and services, cost relative to the social benefit could be greater for one country than for another. The same result as that attained by dictating a particular technology could conceivably be achieved through a system imposing liability for damages on the party responsible for pollution. The latter approach would have the advantage of avoiding undesirable hindrances to innovation and perhaps introduction of more cost-effective pollution-abatement equipment and procedures. It would also leave the choice of technology to those who could be expected to be most familiar with relative costs. The use of liability assignment, of course, hinges on reasonable information costs. Where such costs are reasonable, liability assignment may be an effective way to ease the requirement of harmonization. In effect it lessens the problem of inconsistency in achieving pollution objectives.[22]

It is useful at this point to recall the earlier discussion of coordination of pollution control measures and local tax-prices on pollution. Where there is high factor mobility, efforts of countries to impose high levels of costly pollution control on local firms may be frustrated by the movement of firms to other countries willing to accept lower levels of pollution control. Here a basic trade-off is involved. The most efficient application of antipollution techniques would require a uniform pollution policy across the entire area of high factor mobility. However, such a

[22] For an extensive theoretical and empirical treatment of the issue of standard versus liability assignment to control oil tanker pollution, see P. Cummins, D. Logue, R. Tollison, and T. Willett, "Oil Tanker Pollution Control: Design Criteria vs. Effective Liability Assignment," *Journal of Maritime Law and Commerce* (forthcoming). The reader interested in the costs and benefits of a particular set of design criteria (segregated-ballast construction) proposed for oil tankers by the United States should also consult this paper. It demonstrates in a rather dramatic fashion the dangers and costs of failing to consider appropriate alternatives to stringent rules when confronting environmental issues generally. In particular, the costs of segregated ballasting are estimated on an annual basis. These are then compared to an alternative but more conventional technique for reducing the operational discharge of tankers bringing oil to the United States. The results indicate that segregated ballasting will be somewhere in the range of 1.75 to 4.5 times more expensive, and strongly suggest that the notion of imposing such costly design criteria should be reexamined. In addition, estimates of the benefits of reducing total oil discharges to the standards implied by segregated ballasting are examined. As it turns out, the annual incremental cost of segregated-ballast construction relative to the imputed annual net dollar value of benefits (that is, benefit in excess of these achievable by the alternative method of controlling discharge) yields a ratio of approximately twenty to one. Although the scientific data upon which the benefit estimates are based are not as complete as would be desired, the magnitude of the ratio itself is cause for concern over the wisdom of adopting segregated ballasting to achieve these standards.

policy constrains all parties to accept the same level of pollution control while many communities might prefer different levels of pollution control. For instance, lower-income countries would probably want to give up fewer economic goods and services in exchange for cleaner air and water than would higher-income communities, that is, they would want to buy less pollution control. If factor mobility were perfect, there would be no choice for the larger community but to have a completely unified pollution policy. However, in realistic situations where mobility may be reasonably high but not infinite, there is a trade-off between the effectiveness of the application of pollution policy and the allowance for diversity in choice by the different communities.

A similar situation occurs with respect to macroeconomic policy in the international community. Under fixed exchange rates, the higher the level of interdependence between national economies, the more difficult will it be for a country to follow macroeconomic policies sharply different from those of its trading partners. For a given difference in the rates of inflation in two countries, for instance, the size of the resulting balance-of-payments disequilibrium will be greater, the higher level of interdependence between them.

There is no unique answer to this general question, what is the most desirable trade-off of greater coordination to increase the effectiveness of policies chosen, versus greater sovereignty or autonomy in the choice of policies to pursue? The best combination will vary from case to case depending upon the costs of following independent policies and the strength of different subgroups' desire to choose the policies to be followed.

With respect to the international community and the degree of divergence in the desired policies, it is clear that desires for independent national policies are sufficiently strong that full centralization of economic policy making would not be optimal, but on the other hand the spillovers between many countries are sufficiently great that some degree of policy coordination would be desirable.

We do have a powerful method available to countries, but not to regions within a country, which can help to reduce this dilemma or trade-off between independence and the efficiency of policy implementation. This is the use of exchange rate adjustments to offset the effects of differing sets of underlying economic or policy influences in different countries. Differing desired choices of rates of inflation, employment, and growth between two countries can be rendered consistent with each other by adjusting the countries' relative exchange rates in line with the resulting difference in balance-of-payments trends. In other words, by appropriately adjusting exchange rates, the spillovers from trading partners' macroeconomic policies can be reduced, and the scope for efficiently following independent policies can be increased. This is true even in the case of environmental policies discussed above. If a region of a country, or a country without the option of adjusting its exchange rate or border taxes, decided to raise its

pollution control requirements much higher than those of its trading partners, then even without factor mobility the private costs of its industries would be raised and their competitiveness would decline, resulting in a trade deficit and deflationary pressures. However, where exchange rate or border tax adjustments are possible, this tendency for overall competitiveness to decline could be offset by a depreciation of the exchange rate or increase in general import taxes and export subsidies, thus averting the domestic deflationary pressures which would otherwise result. While specific industry impacts and possible reallocation costs would remain, ability to vary effective exchange rates means that a country need not bear the general macroeconomic costs of depressed economic activity as a result of adopting higher pollution control standards in the same way that such higher costs could cause a generally depressed region within a nation. Thus, the need for coordination of antipollution measures among countries is less than it is among regions within a nation in terms of side effects on the level of economic activity.[23]

In general, then, it is our impression that the need for the harmonization of shipping standards has been greatly overstated. Indeed, international transportation would be a low priority candidate for harmonization as opposed, say, to tax policies. The prospective efficiency gains from harmonization of shipping standards are low, and the benefits of lost diversity may be substantial. The moral of the story: do not overrate the costs of nonuniformity in analyzing international externalities.

"The Common Heritage of Mankind": Alternative Interpretations

Some may fully accept our arguments thus far but go on to raise the objection that, since the oceans have been declared the "common heritage of mankind," does this not in itself make these resources different and hence call for their detailed regulation for the benefit of all? We turn now to this question, and as will become apparent, we conclude that operationalizing the common heritage concept does not have to imply strong regulatory measures over ocean economic activity. Initially, however, a brief review of the origin of the common heritage concept may be helpful.

In 1967, the Maltese ambassador to the United Nations, Arvid Pardo, urged his fellow UN delegates to promote a sincere interest in, and affirmation action by their home countries for, developing a new approach to oceans policy. He argued, in essence, that existing international law was inadequate to deal with the problems that could arise from the diverse forces—technology, population, and nationalism—that were combining to bring chaos to the oceans and conflict among nations. He asserted the need for a comprehensive law of the sea treaty covering virtually every aspect of the oceans' use and of international jurisdiction over their resources.

[23] For a discussion of the latter case, see Sherman and Willett, "Regional Development, Externalities, and Tax-Subsidy Combinations."

In his now famous speech of 1 November 1967 before the United Nations, Pardo suggested that "the seabed and the ocean floor are a common heritage of mankind and should be used and exploited for peaceful purposes and for the exclusive benefit of mankind as a whole." [24] Moreover, he expounded five main principles for the proposed treaty:

> . . . the seabed and the ocean floor underlying the sea beyond the limits of national jurisdiction as defined in the treaty are not subject to national appropriation in any manner whatsoever.
>
> . . . the seabed and ocean floor beyond the limits of national jurisdiction shall be reserved exclusively for peaceful purposes.
>
> . . . scientific research with regard to the deep sea and ocean floor, not directly connected with defense, shall be freely permissible and its results available to all.
>
> . . . the resources of the seabed and ocean floor beyond the limits of national jurisdiction shall be exploited primarily in the interests of mankind, with particular regard to the needs of poor countries.
>
> . . . the exploration and exploitation of the seabed and ocean floor beyond the limits of national jurisdiction shall be conducted in a manner consistent with the principle and purposes of the United Nations Charter and in a manner not causing unnecessary obstruction of the high seas or serious impairment of the marine environment.[25]

Since the notion that the deep seas form part of the common heritage of all mankind has already been widely accepted (and we accept it), ocean resources should be developed for the common benefit of all, though the sharing ratios in these benefits are an open question. However, it has appeared to many that acceptance of this principle would of necessity require the creation of an international regulatory authority to control access to ocean resources, and to tax and control the operations of firms developing ocean resources. Indeed some have even argued that the common heritage concept implies that development of ocean resources by private firms and individuals should be prohibited and that only an international authority should be allowed to operate beyond the limits of national boundaries. In this section we attempt to analyze the meaning of the common heritage of mankind from the standpoint of economic and public finance theory and suggest an operational formulation of this concept that is consistent with liberal economic principles.

A far more appealing way to make operational the concept of the oceans as the common heritage of all mankind is to approach the problem from an economic perspective, fashioning fiscal mechanisms to accomplish this task. In particular, emphasis should be placed on distinguishing the kinds of free access

[24] Excerpted from *Woods Hole Notes*, February 1974, in U.S. Congress, Senate, Subcommittee on Minerals, Materials, and Fuels of the Committee on Interior and Insular Affairs, *Mineral Resources of the Deep Seabed*, p. 1324.

[25] Ibid., pp. 1324, 1325.

that cause no damage to others, and the issues of access to ocean resources generally. In the former case, a good example of which is scientific research, we quite agree that free access is the appropriate policy. Of course, where conflicts of basic freedoms occur, some resolution of rights will have to be made. A good, though improbable, example here would be the case of a scientific ship taking up residence in a heavily travelled channel. In this case we would have to look at the basic trade-off involved in deciding on freedom of scientific research versus freedom of transit.[26] In general, however, free access for scientific research and similar activities should present few problems.

In the case of the freedom of access to ocean resources, extreme confusion has arisen, particularly over natural resources, from the identification of those who physically exploit a resource with those who obtain the benefits from exploitation. This involves the fallacy that physical ownership conveys all the benefits from exploitation to the producer, which is simply not true. The exploitation of real ocean resources, such as manganese nodules, hydrocarbon deposits, and fisheries, will generate three major types of economic benefit. First, consumers throughout the world will benefit from the greater availability and lower prices of the resources obtained. Second, exploiters may find this a more attractive opportunity than others available, generating higher profits and wages than would otherwise be the case. Third, this new activity may represent a marginal addition to the world's tax base.

In the particular case of the exploiters of the resources to which access is free, as the United States proposes, producers should earn a competitive, or normal, rate of return on their invested capital. Perhaps the concern with the ownership of the means of physical production per se derives from some emotional attachment to the land; or perhaps a better analogy would be concern over the great profits that have been made in the discovery of lodes of certain minerals (such as gold) in the past. In that case, of course, producers were not making a normal rate of return; they were earning rents. If ocean mining could be considered analagous to gathering suddenly discovered sunken treasures, then the economic implication would be that producers were making excess returns. The U.S. proposals for free access *and* auctioning of competing claims to ocean resources serve to resolve this type of problem. The common heritage concept suggests that revenues from competitive bids for a claim, which under free access should reflect the rental value of the property, should go into the pool of funds for revenue sharing. In practice these revenues would be negligible for the foreseeable future because property rights to claims will not be scarce. Conceptually, however, competitive bidding for access to property rights in ocean claims sets

[26] See K. Clarkson, "International Law, U.S. Seabeds Policy and Ocean Resource Development," *Journal of Law and Economics*, vol. 17, no. 1 (April 1974), pp. 117-42, for a discussion of some of the trade-offs involved.

the appropriate scarcity values for access to these resources, and revenues for such bidding should go into revenue sharing.

In general, then, we accept the concept of the oceans as the common heritage of mankind, but we would formulate a different set of requirements to make the concept operational in an economic sense. These are threefold:

(1) Potential consumers of ocean resources should not be discriminated against in the purchase of ocean resources. The existence of a competitive market will bring about this result.

(2) Potential exploiters should not be discriminated against in seeking access to ocean resources. This may be achieved by an international authority whose power to impede access to ocean resources is nondiscretionary and minimal.

(3) Not only should the citizens of the countries of origin of the expoiting firms benefit from the expansion tax base represented by the ocean resource industry, but all should benefit, via the sharing of the revenues raised from taxation of ocean resource exploitation and from competitive bids for property rights to ocean resources. Access to ocean resources should not be restricted so as to monopolistically raise revenues at the expense of distorting the efficient allocation of resources.

Whereas our preceding analysis has suggested that implementation of the concept of the common heritage of mankind dictates that the full amount of revenues from competitive bidding should be shared internationally, the result of full sharing does not carry over to the taxation of ocean resource exploitation. The expansion of world "taxable capacity" [27] represented by the exploitation of ocean resources will represent only a small fraction of the taxable capacity of ocean industries. A large portion will represent a diversion of taxable capacity from domestic economies. We suggest that, consistent with the common heritage concept, only the increment to world taxable capacity should belong to the international community. Thus the appropriate treatment of the tax revenues derived from ocean resource exploitation beyond the limits of national jurisdiction is that of revenue sharing. We shall argue below that in these circumstances it is the smaller fraction of tax revenues which should accrue to the international community. First, however, let us briefly discuss some questions concerning the form and extent of taxation of ocean resource exploitation.

In general the standard taxation criteria of efficiency and equity would suggest that there is nothing special about mineral production that merits taxation.[28]

[27] Taxable capacity is a standard public finance measure of the revenue produced by the tax system. The greater the per capita or group incomes, the greater, presumably, the taxable capacity or the ability to generate revenue.

[28] See D. Logue, R. Sweeney, and T. Willett, "Optimal Leasing Policy and the Development of Outer Continental Shelf Hydrocarbon Resources," *Land Economics* (forthcoming) for a general discussion of the principles of taxation as applied to offshore resources.

However, given that land-based mineral production is taxed, there may be a second-best case for taxation of ocean resource production. In this case, if levels of taxation of ocean resource production do not exceed those on comparable land-based resource production, namely minerals, then this taxation may not represent a serious hindrance to the exploitation of the resources of the sea. Within this constraint, the theory of taxation would suggest that a direct tax that does not affect production, such as a profits tax, would be preferable to an indirect tax, such as a royalty tax. But, whereas the direct tax has economic advantages, it would be complex to administer, while the royalty tax, relatively easy to administer, is economically less desirable. In practice the choice between the two types of taxation would depend on the relative weight placed on production distribution due to royalty taxation, and the administrative costs of profit taxation.

Part of the case for revenue sharing derives from the expansion of the world tax base involved in the exploitation of ocean resources, whatever approach to actual taxation is adopted. It is important to recognize, however, that the full amount of new tax base represented by ocean industry is not a net addition to the world's tax base. In part the expansion of revenues from ocean industry will come at the expense of the domestic tax bases of countries whose firms undertake ocean activity (this labor and capital would otherwise presumably have been employed at home, albeit in less advantageous pursuits), and also in the tax bases of countries whose firms face less advantageous markets because of competition from ocean-based production.[29] Because the differential economic advantage of ocean resource development is likely to be relatively small at the margin, the percentage share that should be allocated to the international community likewise should be low, perhaps on the order of 10 to 25 percent.

There are also, of course, a host of important considerations concerning the dissemination and the use of the revenue accruing to the international community. First, one might argue that there is a case for the regulation of the production of ocean wealth on the grounds that without tight regulation an existing inequity in the distribution of income among countries will be perpetrated. Accepting, for the sake of argument, that the latter inequity exists, we want to stress that a regulatory solution does not follow from this argument. In the first place, it is unclear how the benefits of an open-access regime would be distributed. This would depend to a large extent on the incidence of per capita consumption of ocean resources across countries.[30] Also, the traditional theorem stressing that it is more efficient to redistribute income through transfers of purchasing power than through price controls on particular goods holds in the case of the redistribution of wealth produced from oceans. This really repeats our earlier point, that the extent

[29] This is actually an example of an externality imposed by adjustments to taxation. For a discussion of such externalities, see J. M. Buchanan, "Externality in Tax Response," *Southern Economic Journal*, vol. 33 (July 1966), pp. 35-42.

[30] For some evidence on this point, see the paper in this volume by D. Johnson and D. Logue.

of revenue sharing is conceptually distinct from the issue of open access to ocean resources.

Second, it has been pointed out that in the usual case of international taxation, the host country collects a tax on full production where international corporations operate within alternative national boundaries. The full value of local production is taxed and allowed as a credit against taxes in the country where the corporation legally resides. In the case of the expansion of taxable capacity from the development of ocean resources, however, the measure of the expansion of taxable capacity is the net expansion of capacity after the relevant resource reallocations from land-based to ocean-based activities has taken place. As we pointed out, the desired revenue-sharing weights would be placed on this margin. In the usual case of international taxation, taxing the full value of domestic production derives from both legal and economic considerations, and basically reflects the fact that we do not have an international tax base against which to apply a standard set of tax rates. The present system does have an economic rationale to the extent that the payment of the tax by foreign investors reflects a charge for their consumption of local social overhead capital. In the oceans, however, there is the creation of an international tax base, and here we need to be careful to assess the desirable tax rates against the correct economic measure of increased taxable capacity. Also, there would be no consumption of social overhead capital in the oceans against which to levy a charge.

A third point that might be raised addresses the issue of whether competitive access to ocean resources would reflect competitive bids for ocean production sites. This is an important question that would have to be answered by examining the structure of the relevant mineral industries related to ocean mining. It is our impression that the available evidence indicates that this would not be a problem, and that in fact ocean production of minerals would be a major threat (via entry of new production) to existing and potential land-based mineral cartels.[31] A complete study of the structure of these industries, however, needs to be done.

Our general considerations, then, are quite compatible with the basic form of revenue sharing proposed by the United States in this treaty negotiation (an internationally set tax on ocean production, the proceeds of which are divided between an exploiting firm's government and the international community), but they do suggest a lower percentage distribution to the international community than the range mentioned in the 1970 U.S. draft treaty. They suggest that it is quite possible to accept the concept that the ocean beyond the limits of national production is the common heritage of mankind, without this leading to the necessity for extensive resource control on the part of an international authority. Furthermore, the implementation of this approach need not even hinge upon the

[31] See R. C. Amacher and R. J. Sweeney, "International Commodity Cartels and the Threat of New Entry: Some Implications of Ocean Minerals Resources," *Kyklos* (forthcoming).

existence of a treaty, but could be undertaken unilaterally by any country which had the wherewithal to exploit ocean resources.

Toward a Theory of Optimal Negotiations [32]

The law of the sea negotiations are among the most complex negotiations ever to take place. There has been much comment on the lack of apparent progress in the negotiations thus far, and the sheer number of issues involved is frequently mentioned as one reason for this. In the first part of this paper we discussed why theoretically it is not wise to attempt to internalize every international spillover at the highest level possible. In this section we will sketch some tentative elements of a theory of optimal negotiations, which emphasizes the possible costs of considering every issue related to law of the sea in one centralized forum. We hope that this analysis will be helpful in discussion of the advantages and disadvantages of a unified law of the sea treaty on all issues, versus less comprehensive agreements on specific areas.

In the simplest model of economic exchange, trade between individuals typically merges because they place different marginal values (given by the slopes of their respective indifference curves) on the goods they are trading. The analytical apparatus often used by economists to depict trade is called the Edgeworth box, and trade takes place in this setting until the contract curve is reached.[33] The understanding of the economic theory of exchange is really quite simple when thought of in terms of movements to mutually beneficial positions within an Edgeworth box. Analytically, this is depicted as points along the contract curve where the contract curve is defined as the points of tangency between individuals' indifference curves. At these points of tangency the individuals place the same marginal value on the combination of goods being traded, and hence trade ceases. Trade within an Edgeworth box to reach the contract curve may be characterized as positive sum in the sense that both parties are benefited by exchange. Trade that moves individuals along the contract curve may be thought of as zero sum in the sense that what one party gives up the other loses. This is a situation of pure conflict. A final category of trades could be characterized as negative sum in the sense that an individual would not voluntarily engage in such trade, because the expected value of trade would be less than the original endowment which he could retain by not trading (playing the game). Normally, these latter types of trade are not quantitatively important since most trade that we observe is voluntary. A well-known axiom of politics, at least domestic politics, however, is that

[32] The discussion in this section is taken from our forthcoming book on *International Economic Interdependence: A Public Choice Perspective*, to be published by Heath Lexington.

[33] See A. A. Alchian and W. R. Allen, *University Economics: Elements of Inquiry* (Belmont, Calif.: Wadsworth, 1972), pp. 47-49, for a clear discussion of exchange theory in terms of an Edgeworth box diagram.

one cannot refuse to play. Moreover, as we shall see, the possibility of negative-sum trade has to be considered in international negotiating processes. We can now turn specifically to the issues involved in optimal negotiations.

An important question in the context of international relations is, at what level of aggregation should decisions among nations be made or discussed? That is, how many issues should be included in a decision-making package and at what level of the respective governments should trade in matters of international policy take place? While we cannot give precise answers to these questions, we can elaborate some general principles by employing some concepts from the foregoing discussion. It will be useful to remember that the objective of trade is presumably to reach the contract curve (an agreement satisfactory to both parties), and the following discussion will be largely couched in such terms.

When negotiations take place on a single issue, and side payments are not possible, the agreement reached by two parties may be off the technically efficient contract curve. In order to divide the benefits from the agreement in a mutually satisfactory manner, it may be necessary to accept compromise outcomes which are off the contract curve, that is, which leave open the possibility of changes that would raise the utility of both parties if direct side payments were possible.[34]

Where the contract curve is clear and well understood by all parties, the aggregation of issues is quite helpful to the process of reaching international agreement. This follows since attempts to reach agreement by focusing on one issue at a time are likely to be frustrated by the limited ability of participants to make direct side payments in international negotiations in order to reach the contract curve.[35] Aggregating issues and dealing with them at the highest level allows greater scope for indirect trades to come closer to the contract curve. In this way, vote trading in legislatures may contribute to more efficient outcomes.[36] A multiplicity of issues creates more possibilities for indirect trades leading to productive agreements.

However, there may also be problems in aggregating issues. Frequently there is a fundamental disagreement about the nature of the contract curve. In other words, there is no agreement on what is best with respect to a particular policy. A good example of this situation would be the issue of fixed versus flexible exchange rates in the international monetary system. In such a case, it may be best not to aggregate underlying issues or decisions; aggregation of issues would in general intensify government-to-government conflict.

[34] A point which we do not discuss in detail here but which we feel is quite important in the context of the theory of optimal negotiations is the importance of agenda setting. For a very interesting discussion of this aspect of voting theory, see C. R. Plott and M. E. Levine, "On Using the Agenda to Influence Group Decisions: Theory, Experiments, and an Application," California Institute of Technology Working Paper No. 66, November 1974.

[35] See Albert Breton, "Public Goods and the Stability of Federalism," *Kyklos*, vol. 23, no. 4 (1970), pp. 882-901, for a related discussion of this point.

[36] See Mueller, Tollison, and Willett, "A Normative Theory of Representative Democracy."

A similar case could occur where there is some degree of consensus among experts about the nature of the contract curve, but where the issues involved are so complex that the higher-level decision makers who are making the trade-offs will not be able to understand them. Hence, complexity of issues will sometimes restrict the degree to which they should be aggregated for discussion or decision.

In some of these cases it is better, then, not to aggregate or defer issues or decisions and to allow discussion to be handled at a lower level in the government-to-government process. The nature of the work at this lower level would be the presumably technical task of clarifying the nature of the contract curve.

What we have stressed so far in this section is the importance of more issues, not more actors. A point that has an important bearing on the highly centralized manner in which the law of the sea negotiations have taken place concerns the effect of increasing the number of actors in dramatically increasing decision costs. In this setting, where the number of actors is increased against a given number of issues, it is more difficult to reach optimal collective agreements.[37] For one thing, the transactions costs of keeping track of more details on issues is increased immensely. That is, it becomes incredibly difficult for the actors to be informed on the relevant trade-offs among all issues and all actors, and to consummate trade-offs among various coalitions.

Indeed, an optimal outcome is not even assured by the provision of an enforceable mechanism for international collective decision making. Where voting power differs substantially from the distribution of potential costs and benefits derived, collective outcomes may be both inequitable and inefficient.

Attempts to skew the costs and benefits of outcomes by the majority of countries may result in the underprovision of the public good in question. Essentially, the provision of the international public good is a mixed-motive game, with the scope for potential benefits to all from the provision of the public good yielding cooperative elements, the positive-sum aspect of the game, while the desire to minimize one's share of the cost of providing the public good leads to competitive zero- or negative-sum elements. To attempt to secure too great a share of the benefits is to run the risk of failing to provide the good at all, or in sufficient quantities. The prospect for underprovision in such circumstances is increased by the fact that it is usually far easier for nation states to withdraw from international agreements than it is for citizens to withdraw from the effective jurisdiction of national political decisions.

Even in organizations with weighted voting there is considerable difficulty in designing the appropriate basis for weighting. This is compounded both by the changing positions of countries over time and the possibility of enormous variation of "interests" with respect to different issues. In formal organizations, as voting

[37] An interesting question in its own right involves the determination of the optimal number of issues relative to actors.

procedures are generally instituted, it is difficult if not impossible to vary voting weights to correspond appropriately to the realities of various situations. In practice, some scope for varying effective voting weights is provided by vote trading on various issues. The workability of such systems, however, is itself dependent upon there being some reasonably stable pattern of interests over a reasonable period of time. The discrete nature and importance of the issues which face the international community tends to necessitate ad hoc responses outside of overly formal international institutional arrangements. Thus, even if more efficient voting mechanisms were instituted within our formal international arrangements, we would still need flexibility for the ad hoc development of new forums and institutions as major new situations arise. Although some inefficiency is undoubtedly generated by multiplying ad hoc and formal international forums and institutions, it is likely that any fully optimal pattern would display considerable untidiness, and would change over time.

Finally, in some cases not enough is known about an issue to define a reasonable policy, and the contract curve might be characterized as fuzzy. A particular example of this type of problem in the law of the sea negotiations is the procedure of referring technical issues on which agreement cannot be reached to the World Court. This seems to be a poor way to reduce decision costs on complicated issues. In general, what criteria would one follow in referring technical issues to be decided after general agreement on principles is reached? First, it would seem optimal to delegate decisions on specific technical details where the potential benefits of reaching general agreement on principles is high. Where technical details relate to the substance of the agreement, however, as is frequently the case, it would not be sensible to leave them to be decided until after general agreement is reached. For instance, agreement in principle that there should be free access to ocean resources could easily be undermined if considerable discretionary power were in fact given to an international authority to regulate licensed firms.

Conclusion

Reaching international agreements is difficult, and the law of the sea negotiations are an excellent example of the difficulties involved. Our main point is that negotiators should concentrate on areas where agreements can render the largest contribution. Collective decision-making resources are scarce and must be allocated to achieve the greatest benefits from international negotiations. Thus, negotiators must take care to understand the technical trade-offs involved in the relevant issues. Market failure per se is not a sufficient basis for justifying international agreements to control externalities. Costs must be weighed against benefits in particular cases, recognizing that perfect intervention by governments or

international organizations is not possible. Likewise, in deciding which level of government will control externalities, we must consider the dimensions of the externalities. In some cases in the law of the sea negotiations this will mean emphasizing bilateral or regional agreements to handle international spillovers. Finally, we have sketched a tentative theory of optimal negotiations that emphasizes the difficulties of trying to decide upon all issues in a given area of negotiations in a single forum, and the theoretical advantages (and practical difficulties) of applying weighted voting in international negotiations.