

CHOICE AMONG POLICY INSTRUMENTS
FOR POLLUTION CONTROL

Giandomenico Majone

February 1976

Professional Papers are not official publications of the International Institute for Applied Systems Analysis, but are reproduced and distributed by the Institute as an aid to staff members in furthering their professional activities. Views or opinions expressed herein are those of the author and should not be interpreted as representing the views of either the Institute or the National Member Organizations supporting the Institute.

Choice Among Policy Instruments For Pollution Control

Giandomenico Majone

International Institute for Applied Systems Analysis,
Laxenburg, Austria

Abstract

This paper discusses alternative approaches to the problem of pollution control, from the point of view of a closed model in which regulators, regulated, and other interest groups interact in a single decision structure. It is argued that policy instruments cannot be selected only, or even primarily, on the basis of their formal properties, for these allow a number of different, often conflicting institutional realizations. The crucial choices involve not the instruments themselves, but institutionally determined ways of operating them. But to discuss institutional choice adequately, the usual model in which people pursue their self-interest within exogenously determined rules must be extended to cover the determination of the rules themselves. The comparison between, say, an uncorrupted system of effluent charges, and regulatory machinery captured by special interests is then seen to be a specious one. Where effluent charges have been used, they have proved to be as subject to bargaining and as conditioned by considerations of political and administrative expediency as standards, licenses, and other regulatory measures.

1. THE INSTITUTIONAL CHOICE APPROACH

Careful analysis of recent environmental policies in the United States and in Europe raises issues that require a critical reexamination of the commonly accepted model of public decision making. Although the box of policy tools has been significantly enriched by a number of clever techniques proposed by economists and other policy analysts over the last ten or fifteen years, legislators and administrators show little interest in the new instruments, and continue to rely largely on methods (primarily of the regulation/enforcement variety) whose shortcomings have been repeatedly pointed out.

In the few instances where more sophisticated tools have been used (like effluent charges in France and the Netherlands), they have supplemented, rather than replaced, the traditional approaches. Moreover, the new instruments have not produced, so far, the results that had been expected on the basis of their technical properties. Nor have they brought about the profound changes in policy making that their advocates had predicted; the injection of new wine in old institutional bottles has not simplified, but actually further complicated an already confused regulatory framework.

The disappointment of the tool-makers is understandable; less so is their failure to recognize the inadequacy of the model of the policy-making process that underlies their proposals. As Buchanan has pointed out¹, in the traditional economic approach the public choices that define the con-

1. James M. Buchanan, "Toward Analysis of Closed Behavioral Systems", in Buchanan, J. M. and Tollison, R. D. editors, Theory Of Public Choice, Ann Arbor, Mich.: University of Michigan Press, 1972, pp. 11-26.

straints within which market behavior is allowed to take place, are assumed to be made exogenously, by others than those whose behavior is being studied. In spite of the belated discovery by economists of the "politics of regulation", this assumption underlies most economic analyses of environmental policies, at least in their more formal aspects. The artificial separation of the behavior of individual actors in the market place, where the institutional constraints are given, from their behavior in the political arena, where those constraints are established, impedes serious discussion of environmental policies, at the descriptive and at the normative level. Descriptively, a considerable amount of empirical evidence, some of which will be reviewed here, clearly shows that people pursue their self-interest not only within given rules, but also by investing resources to change the rules to their own benefit. And once this fact is recognized, "normative economics enters an Alice-in-Wonderland world in which policies that are desirable in the truncated model lose much of their appeal."²

In this paper I examine alternative approaches to the problems of pollution control from the viewpoint of a "closed" model in which regulators, regulated, and other interest groups interact in a single decision structure. The model is derived from the "public choice" or "institutional choice" theories developed recently as necessary complements of the traditional theory of market transactions.³ The main objective of a theory of institutional choice is "to

2. Victor P. Goldberg, "Institutional Change And The Quasi-Invisible Hand", The Journal Of Law And Economics, XVII(2), October 1974, pp. 461-492.

3. See in particular, Buchanan and Tollison, op. cit. and Goldberg, op. cit. In treating together these two approaches, I am not overlooking the significant differences that exist between them, especially with respect to the assessment of policies for controlling "market failures." But for the

determine how extending the domain of self-interest to the determination of the rules themselves changes the relative desirability of certain institutional arrangements."⁴ For instance, the amount of resources that a group will have to influence rule changes depends on its ability to induce potential free riders to contribute to the group, and upon the ability of opposing groups to constrain their free riders. Hence, interest groups have an incentive to invest resources to restructure the rules concerning coalitions; in Goldberg's apt expression, the rules "both define the existing environment for choice and provide an arena for conflict." Citizen groups, for example, will press for the possibility of class action in court, by which an individual or organization can sue on behalf of large numbers of similarly affected citizens, instead of the so-called nuisance doctrine, whereby an individual can sue a polluter only if he can show that he is uniquely affected by his activities.

Similarly, differentially distributed resources (money, votes, technical expertise, social prestige) are valued differently under alternative institutional arrangements. Thus, groups will attempt to bring about rule changes that reward the resources in which they have a comparative advantage. Even jurisdictional boundaries are subject to manipulation by people trying to change them in their own self-interest. Gerrymandering is an obvious example, but similar forms of jurisdiction-changing behavior can be found in the environmental field, see section 4.

purpose of the present discussion, it is the commonality of the basic insights that is important. Lindblom's work on decision making through mutual adjustment should also be mentioned in this connection.

4. V. P. Goldberg, op. cit., p. 464.

The attitudes of most economists toward such manipulations of the institutional framework have been of two kinds: they have either neglected the phenomenon, being content, as Knut Wicksell remarked many years ago, with assuming the presence of a benevolent dictator capable of defending the public interest more effectively than an imperfect democratic system; or attributing the cause of the evil to the corruptibility of the instruments used by the policy maker, they have proposed mechanisms that are supposedly fail-safe with respect to the possibility of political interference.⁵ Actually, both attitudes often coexist in the same writer.

The capture of the regulatory commissions by the very interests they are supposed to control, and the ultimate futility of economic regulation, have been repeatedly discussed, and to some extent documented.⁶ These facts have been inter-

5. A third approach has been suggested by Goldberg: exhortation or propagandizing -- trying to induce people to act other than in their immediate self-interest or simply fooling them into acting otherwise. Regulations, licenses, subsidies, accelerated depreciation are not good for society, and therefore beneficiaries should not use their resources to buy them.

6. For a sample of the relevant literature, see George J. Stigler and Claire Friedland, "What Can Regulators Regulate? The Case Of Electricity", The Journal Of Law And Economics, V, October 1962, pp. 1-16; Paul W. Mac Avoy, ed. The Crisis Of The Regulatory Commissions, New York: W. W. Norton, Inc., 1970; George J. Stigler, "The Theory Of Economic Regulation", The Bell Journal Of Economics And Management Science, vol. 2, no. 1, Spring 1971, pp. 3-21; Richard A. Posner, "Theories Of Economic Regulation", The Bell Journal Of Economics And Management Science, vol. 5, no. 2, Autumn 1974, pp. 335-358.

puted as providing additional confirmation of the virtues of the market, and of the need to reduce governmental intervention. This critical literature has its counterpart in many analyses of environmental problems, where the administrative approach to pollution control (prohibitions, standards, incentives, and so on) has been severely criticized for its lack of effectiveness, and for its tendency to become "a political process entailing bargaining between parties of unequal power."⁷ Effluent charges and related market-oriented techniques have been proposed as alternative approaches that, by their automatism and in conjunction with the integrated management of river basins and airsheds, "would reduce the scope for administrative discretion and bargaining."⁸

But these normative conclusions overlook one important point: the same forces that influence and distort the regulatory framework, will also affect other approaches, by the same or by different methods. The comparison between, say, an uncorrupted system of effluent charges, and a regulatory machinery captured by special interests, is a specious one.⁹ Where effluent charges have been used, for instance, in France, they have proved to be as subject to bargaining and as conditioned by considerations of political and administrative expediency, as standards, licenses, and other regulatory measures. Thus, the search for a system that "would resolve most of the political conflict over the environment

7. A. Myrick Freeman III, Robert H. Haveman, Allen V. Kneese, The Economics Of Environmental Policy, New York: John Wiley and Sons, Inc., 1973, p. 105.

8. Ibid. p. 170.

9. Goldberg makes the same point in connection with recent theories of economic regulations.

in a highly visible way", in the same sense in which PPBS was supposed to lift the budgetary process out of the morass of political compromise, is bound to lead to disappointments and, in the final analysis, to doubts "as to the ability of a pluralist political system to make wise choices in issues of this sort."¹⁰

If bargaining is inevitable because of the disagreement over values, insufficient ecological knowledge, competition with other public programs, and serious distributional consequences, that characterize environmental policies, then focusing attention on the possibilities of improving the bargaining process, and the institutional framework within which the process operates, seems a more constructive and hopeful approach. The ability of the policy maker to nudge the process toward desired outcomes depends on his realistic appreciation of its dynamics, and on the sober assessment of the degrees of freedom of the system. The actual outcomes of environmental policies are more significantly affected by the institutional arrangements emerging from the political process than by the technical characteristics of the instruments used. To use a statistical image, the "within group" effects (meaning the differential results obtained when the same tool operates under different institutional circumstances) dominate the "between groups" effects (the results of different tools used under approximately equal conditions). In other words, the significant choice is not among abstractly considered policy instruments, but among institutionally determined ways of operating them. Such a choice cannot be made by fiat: it results from the relative distribution of power, the political constraints, and the skill of the policy maker to exploit whatever slack remains in the system. This conclusion throws new light on the systemic rationality of policies

10. Freeman, Haveman and Kneese, op. cit., p. 104.

that would be rejected on the basis of some narrow criterion, such as economic efficiency.

2. APPROACHES TO POLLUTION CONTROL

In this section I shall review the major tools of pollution control policy, under the headings: a) regulation, direct public action and subsidies; b) effluent charges; c) contract and redefinition of property rights; d) organization.

Regulation may either consist of general rules, or of specific decisions on individual cases (directives). Some examples are effluent standards, licenses, design and production norms, and prohibitions. The public authorities may also decide to intervene directly to relieve the consequences of a particularly serious environmental condition, or to augment environmental resources through investment. Subsidies and other forms of economic incentives, such as accelerated depreciation for tax purposes, occupy an intermediate position between regulation and direct intervention.

Among the regulatory tools, effluent or emission standards are probably the best-known and most frequently used.¹¹ In theory, effluent standards should be established on the basis of the optimum level of environmental quality (where marginal treatment costs equal marginal damages, or total cost of residual disposal is at a minimum) or, at least, on an explicit ambient quality standard.

11. See my paper, "On The Logic Of Standard Setting In Health And Related Fields," in N.T.J. Bailey and M. Thompson, editors, Systems Analysis of Health Planning, Amsterdam: North Holland Publishing Co., 1975, pp. 279-290.

In practice, effluent standards are often arbitrary, in the sense that they are not related to the achievement of specific goals of environmental quality, but are based on some rule of "good practice." Whatever the basis for deciding on a total allowable quantity of residuals discharge, difficult problems of implementation arise when the public authorities have to allocate this total among the different dischargers. For a given level of allowed discharge, total cost is minimized when the marginal treatment costs of all dischargers are equal. But in the absence of such detailed cost information, the authorities will have to rely on some rule of thumb (e.g. equal standards for all) that is highly unlikely to correspond to a minimum-cost allocation of discharge permits.

Effluent charges are often considered, particularly by economists, the best tool of environmental policy. The underlying logic is simple and compelling. If the damage caused by different concentrations of residuals were known, the public authorities would simply establish a charge or price equal to the marginal damage for each unit of residuals. Polluters would then decrease their residuals flows as long as the marginal cost of doing so was less than the price for discharging, settling at the optimum where marginal treatment costs equal the charge. Even when the damage function is unknown, the usual case, the system can be used, with a (politically determined) environmental quality standard replacing the unknown damage function; however, knowledge of marginal treatment costs must be assumed. The correct charge equals the marginal treatment cost at the point where the marginal treatment cost curve meets the environmental quality standard. In either case, the environmental goal would be reached at minimum social cost.

With respect to economic efficiency and environmental effectiveness, effluent charges are the converse, so to say, of effluent standards. Given a set of ambient standards and appropriate enforcement procedures, effluent standards can always be calculated so as to satisfy the environmental objective; but

there is no way of knowing that the objective is met in an economically efficient manner. On the other hand, for any given level of effluent charges, the resulting reduction in pollution is achieved at the least cost, but there is no guarantee that the charges are sufficient to meet the environmental standards. However, any violation of the ambient standards can be quickly detected, and then, so goes the argument, it would suffice to raise the charges until the standards are satisfied. The information necessary to set correct effluent charges is never greater than that required for effluent standards, and in many situations it will be actually less. This follows from the fact that in order to calculate the optimal charges it is sufficient to know the aggregate volume of waste flows from the different pollution sources, while the total volume would have to be disaggregated in order to establish effluent standards capable of achieving the same waste reduction at the same cost as effluent charges.¹²

The next group of policy instruments is representative of attempts to internalize environmental externalities through utilization of the existing legal system, or a better definition and enforcement of property rights. Whenever the cost of reducing the damage inflicted by a pollution-creating activity (by decreasing the scale or changing the technology of the operation) is less than the benefits created by the abatement, there arises the possibility of a contractual solution. The pollutees can afford to pay the polluter enough to cover the abatement costs, and in such a way that the transaction is advantageous for all parties concerned.

12. See K.G. Maeler, Environmental Economics: A Theoretical Inquiry, Baltimore and London: The Johns Hopkins Press, 1974, pp. 204-207, for some qualifications to this statement.

It should be noticed that such a system of contractual payments (or "bribes", as they are often called) could in principle achieve the same result as a scheme of optimal effluent charges. The "in principle" character of this statement must be stressed, however. Unless the number of parties is quite small, the familiar free-rider phenomenon will appear. Since it is technically difficult to exclude anyone from the benefits of the pollution-abatement measures, the incentives to contribute to the necessary payments are correspondingly reduced. This will make the contractual solution infeasible without some assistance from the state to overcome the free-rider problem. Nor is this the only difficulty. How can one rule out the possibility that the contractual solution may degenerate into a form of blackmail, with one party creating pollution for the purpose of extorting payments from others? The answer is that polluters and pollutees are assumed to act within a legal framework that determines their respective bargaining position.¹³ For instance, the existence of a right of a private individual to seek an injunction or to sue for the damage created by a pollution-generating activity will strengthen his bargaining position. But in a situation where one polluter inflicts relatively light damages on a large number of people, the bargaining advantage created by the right is more apparent than real, if nuisance actions are possible only on a case-by-case basis; for the costs of court action would probably exceed the expected benefits. Hence we can expect that a good deal of effort will be devoted to make class actions possible, or perhaps to introduce regulations forbidding certain types of activity (e.g., smoke ordinances).

13. Ralph Turvey, "Side Effects Of Resources Use," in A. C. Enthoven and A. M. Freeman III, editors, Pollution, Resources And The Environment, New York: W. W. Norton, 1971, pp. 59-71.

It is now generally recognized that the main difficulty in internalizing the costs of environmental pollution is the ambiguous specification of exchangeable property rights in media like water or air. Dales' proposal to establish a market in pollution rights is an interesting attempt to remove some of the ambiguity.¹⁴ According to this proposal, the government sets an upper limit x (in equivalent tons) to the amounts of discharge into the environment of a region (water being the environmental medium for which the proposal has been originally advanced), for a given period of time. It then issues x pollution rights, or licenses, and puts them up for sale, requiring at the same time that everyone who discharges one equivalent ton of waste during, say, a year, should hold one pollution right for the entire year. If x is less than the number of equivalent tons of waste being currently discharged, the rights will command a positive price, and a continuous market will develop in response to the competition among buyers and sellers of pollution rights.

The proposal has considerable merits. It achieves an efficient allocation of resources, even under quite complex circumstances;¹⁵ it provides a planning tool that utilizes, to the maximum extent possible within the framework of an artificially created market, the flexibility provided by the price mechanism; it reduces administrative costs by relieving administrators of the necessity of setting a charge for pollution rights, and changing it periodically to reflect regional economic growth and decline. Last but not least, while a regulatory

14. J. H. Dales, Pollution, Property, and Prices, Toronto: University of Toronto Press, 1968.

15. W. David Montgomery, "Markets In Licenses And Efficient Pollution Control Programs", Journal Of Economic Theory, 5, 1972, pp. 395-418.

approach implies a kind of status-tenure property right that can only be transferred when the property to which it applies is sold, the proposed scheme separates the property right to environmental use from the other assets of the discharger, thereby making the property right fully transferable. This is in agreement with the preference for contractual solutions that characterizes liberal democracies.

Dales' method presents also a number of difficulties and dangers: the definition of suitable environmental regions; the selection of time interval during which the number of pollution rights is fixed; control costs; the possibility that licenses may be hoarded in an attempt to create barriers to entry and monopolistic positions; the danger of an induced reduction in industrial mobility. Even more important for an assessment of the practical significance of the proposal, is the fact that the system can only work if the government is adamant in its determination not to change the rights issue during the chosen time interval, regardless of the political pressures to do so that can be anticipated. "Pollution rights", Dales writes, "are fully transferable property rights, and any welching on the enforcement of the right would be a breach of trust." But one wonders by which institutional means an environmental policy of this type would succeed in resolving the conflict between integrity and expediency that has characterized, say, discretionary fiscal policies over the last decades. The analogy with the difficult relations between the U.S. Congress, the central monetary authorities, and the executive over fiscal policies is, I would argue, a pertinent one, and justifies a good deal of skepticism in this respect. It is known, for instance, that on a number of occasions, the Federal Reserve Board has yielded to pressure from Congress and the President to avoid higher explicit taxes, by standing ready to purchase

(or lend against) any quantity of government securities at par.¹⁶ Can one really expect that the environmental authorities would be able to withstand analogous political pressures to tamper with the rules of the artificial market in pollution rights? The practical significance of a policy instrument, intellectually attractive as it may be, cannot be evaluated without some specific assumptions about the institutional framework in which it is supposed to operate.

Up to this point, the discussion has proceeded as if control of waste discharges and of dangerous emissions at individual point-sources, was the only way of dealing with pollution problems. Actually, a broader approach is often called for, at least for two reasons. First, important economies of scale can be achieved by joint action. In the field of water management, for example, low-flow augmentation, stream reaeration, ground-water recharge for quality improvement, and effluent diversion or redistribution to make better use of natural assimilative capacity, are more efficiently organized on a collective basis. Second, there are important interdependencies among the different uses of the environment, which cannot be satisfactorily treated at the microlevel.

Consequently, it has been proposed that agencies be created to manage river basins and airsheds on an integrated basis. In the strong version of the proposal, the agencies should be empowered to plan, design, construct, operate, and finance virtually all environmental quality-control measures.¹⁷

16. Armen A. Alchian and William R. Allen, University Economics, London: Prentice/Hall International Inc., 3rd edit. 1974, ch. 28.

17. Allen V. Kneese and Blair T. Bower, Managing Water Quality: Economics, Technology, Institutions, Baltimore and London: The Johns Hopkins Press, 1968, ch. 10.

No existing organization fully realizes this goal, but the Wassergenossenschaften of the Ruhr region in Germany, the Regional Water Boards (Hoogheemraadschap) in the Netherlands and, perhaps, the Delaware River Basin Commission in the United States are reasonably close approximations. Expectations that the French River Basin Agencies (Agences Financières de Bassin) created by the loi-cadre of December 16, 1964, would be given authority to build and operate regional-scale projects have not been fulfilled so far.

The extent of the powers that an environmental protection organization should have, is only one of the problems of institution building in this area, and not the most important one. The crucial issue is that of balancing the immediate needs of environmental effectiveness and economic efficiency with the long-run requirements of institutional viability. The central role played by bargaining processes in reconciling these conflicting aims has been ably discussed by Matthew Holden¹⁸, and little needs to be added to his analysis at this point of my argument. However, the experience of the French river basin agencies, about which more will be said later, may be mentioned here as a good example of the gap separating synoptic ideals from actual practice. According to two well known American experts, writing a few years after the enactment of the 1964 law,

"[t]he French agencies.....seem to have an absolutely clear objective -- economic efficiency in the full sense of the term.

The aim is to establish a system in which the incremental costs

18. Matthew Holden Jr., Pollution Control as a Bargaining Process, Ithaca, New York: Cornell University Water Resource Center, 1966.

of further improvement of water quality balance the incremental benefits, and in which the full range of alternative ways of improving water quality can be assessed and all measures brought into optimal balance."¹⁹

The actual results have been different, as noted by a recent French observer:²⁰

"There is no doubt that the Agences financières de bassin are the keystone of the system, but one cannot fail to be struck by the motley array of arrangements for issuing licenses and of technical and economic controls. On the one hand, users are faced with a plethora of complicated regulations, while, on the other hand efforts are being made to remedy the defects by means of more modern arrangements which include shadow programming on the lines of the French Economic Plan and depend on economic incentives involving financial loss for those who cause pollution in defiance of the regulations."

Even in the land of Cartesian clarity, the policy maker does not write on a clean slate; second-best solutions are the inevitable result of the clash between technocratic aspirations and what Toynbee has called the "intractability of institutions."

19. Kneese and Bower, Managing Water Quality, cit., p. 283.

20. Jean-Phillipe Barde, "An Examination Of The Polluter-Pays Principle Based On Case Studies", in Organization For Economic Co-Operation And Development, The Polluter Pays Principle, Paris: O.E.C.D., 1975, p. 100.

3. THE CHOICE PROBLEM

Faced with a multiplicity of possible approaches, how does the policy maker choose the most promising instrument, or combination of instruments? Or is this, perhaps, a misleading way of representing his problem? These are the issues to be examined now.

The synoptic problem solver would proceed along familiar lines.²¹ He would start out by explicitly listing a set of criteria; he would then select that tool, a mixture of tools, that is optimal with respect to the chosen criteria or at least, is not uniformly dominated by any other alternative. Alternatively, he may single out one criterion as the most important one, which then becomes his operational goal, treating other relevant criteria as constraints.

21. The synoptic problem solver: "1. identifies, scrutinizes, and puts into consistent order those objectives and other values that he believes should govern the choice of a solution to the problem; 2. comprehensively surveys all possible means of achieving those values; 3. exhaustively examines the probable consequences of employing each of the possible means; 4. chooses a means -- that is, a policy or combination of policies -- that will probably achieve a maximum of the values or achieve some acceptable level of achievement." Cf. Charles E. Lindholm, The Intelligence Of Democracy, New York: The Free Press, 1965, pp. 137-138.

The criteria commonly used in synoptic evaluations of environmental policy tools are: environmental effectiveness; economic efficiency; political and administrative feasibility; flexibility; compatibility with the existing institutional framework (e.g., with the basic principles of a market economy). In addition, a good deal of attention has been recently given, especially by international organizations like O.E.C.D. and the European Economic Community, to the so-called polluter-pays principle, as a sort of higher-level criterion.

The principle says that the polluter should bear the expenses of carrying out the measures decided by the public authorities to ensure that the environment is in an acceptable condition. In practice, this means two things:

(1) the cost of these measures should be reflected in the cost of goods and services causing pollution in production and/or consumption; (2) the measures should not be accompanied by subsidies that would distort international trade and investment.

The first thing to be noticed about the criteria is the heterogeneity of the values that they individually embody; the second, is their lack of specificity. Value heterogeneity is exemplified by the difficulty of reconciling political feasibility with the conditions for economic efficiency. The lack of specificity is particularly obvious in the case of the polluter-pays principle which, as usually interpreted, rules out only the subsidies alternative; and even this limitation is weakened by a number of exceptions.²²

22. Exceptions are generally admitted in case of acute socio-economic dislocation or of conflicts with other governmental objectives, such as regional development, or in order to stimulate experimentation with new pollution control technologies. The principle could perhaps be interpreted so as to rule out also the "bribe" solution, and any other form of bargaining. But this a priori

In view of the partially conflicting nature of the criteria, it is not surprising that a uniformly better approach cannot be found. Even with respect to a single criterion, there is no generally superior approach. Thus, although the superiority of effluent charges over regulation is assumed by most economists, it has been shown that an economically optimal policy may require a combination of both. In the case of fisheries, for instance, optimality is achieved by a tax on catch, accompanied by regulation of mesh size.²³ And while the ineffectiveness of regulatory environmental policies has been documented in a number of studies, an unbiased observer can easily find non trivial counter-examples. The United Kingdom Clean Air Act of 1956, for example, has been quite effective in reducing the level of smoke emissions in the atmosphere. This law relies primarily on prohibitions, regulations (of smoke emissions, with a varying standard depending on location, and of height of chimneys), and on various forms of subsidies to consumers and industries. The positive results achieved can be shown by a number of indices. In 1951, domestic consumers used 11.9 billion therms (1 therm = 100.000 British thermal units) of solid fuel, out of a total consumption of 14.1 billion therms, in 1971 total consumption had remained at the same level, but consumption of solid fuel had been reduced to 6.1 billion therms. In 1952, domestic users, industries, and railways used 37.3, 63.3, and 14.1 million tons of coal, respectively, but only 27.4, 37.9, and 2.8 million tons in 1965. Finally, the emission of smoke decreased from 2.42 million metric tons (mmt) in 1951, to 1.56 in 1961 and 0.77

exclusion of potentially useful methods should be regarded as a serious shortcoming of the principle, even if it increases its selective power.

23. Ralph Turvey, "Optimization And Suboptimization In Fishery Regulation," The American Economic Review, March 1964, pp. 64-76.

in 1970 (on the other hand, the emission of sulphur dioxide, that was left out of the scope of the 1956 Act, went from 4.77 mmt in 1951, to 5.53 in 1961 and 5.95 in 1970).

The impossibility of finding an unambiguous ranking of policy instruments has led some analysts to conclude that one should always use a mixture of instruments, and that "each case must be considered on its own merits."²⁴ But this syncretic philosophy fails to recognize the real source of the difficulty. Let us consider again economic efficiency as a criterion of choice. All three price-based approaches discussed in section 2 (effluent charges, bribes, and marketable pollution rights) satisfy this criterion, in spite of significant differences in the corresponding institutional arrangements. Thus, under the bribes system, the pollutees or the public authorities offer to pay an amount equal to the marginal damage avoided for each decrease in residuals discharge. Since an additional unit of discharge represents an opportunity cost for the polluter, equal to the foregone receipt of the bribe, the method would have the same allocative consequences as a system of charges: the two instruments are equivalent in terms of economic efficiency. But in the bribes solution, property rights in the environment are held to be vested in the polluters, while the use of charges implies that those rights are vested in the community, with the public

24. See, for instance, Ralph Turvey, "Side Effects Of Resource Use", cit.; O. A. Davies and M. I. Kamien, "Externalities, Information And Alternative Collective Action" in The Analysis And Evaluation Of Public Expenditures: The PPB System, Washington, D.C.: U.S. Government Printing Office, 1969, pp. 67-68; Rat von Sachverstaendiger fuer Umweltfragen, Umweltgutachten 1974, Stuttgart: Verlag Kohlhammer, G.M.B.H. 1974.

authorities acting as agents for the sale of rights to the assimilative capacity of the environment. The actual implications of the charges approach have been recognized by industrial spokesmen, who have attacked effluent charges as "punitive levies," whose purpose is not pollution abatement, but revenue and "ultimately, a control over the national economy."²⁵ Advocates of the approach in a sense share the same view when they admit that "[s]uch massive transfers of property rights and the wealth they represent seldom occur in the absence of substantial political upheaval."²⁶

The inadequacy of economic efficiency as a criterion of choice among policy instruments is now clear, if it is admitted that efficiency and equity considerations cannot be separated in policy making (although they may be usefully distinguished in other, more limited, contexts). For, as Coase has shown, the absence or existence of a right to the use of the environment does not affect the allocation of resources, but only the fairness of what happens. More generally, it is impossible to draw conclusions about appropriate institutional arrangements from an analysis of the formal conditions for an optimum, since the same formal conditions can be satisfied by a variety of essentially different arrangements.²⁷

25. John E. Kinney, "Effluent Taxes: Abatement Prods Or Budget-Balances?", Industrial Water Engineering, April 1971, pp. 18-22.

26. Freeman, Haveman, and Kneese, The Economics Of Environmental Policy, cit., p. 170.

27. In the same way that, as Pareto and Barone have shown, "the equilibrium allocation of resources in a freely competitive society based on private property is identical with the allocation that should be sought by a socialist state striving to achieve a maximum of "ophelimity" and that, on the formal level alone, totalitarian direction might achieve the same allocation of resources as a free

Incidentally, this explains why so many discussions of the "economics of environmental policy" fail to carry conviction in their policy recommendations. The reason is not that they disregard the non-economic aspects of environmental problems. Rather, their treatment of the political, administrative and legal issues, or of the distributional implications of the proposed solutions, usually bears little logical relation to the formal economic analysis.

To state once more the central thesis of this paper: policy instruments are not selected on the basis of their formal properties, for these allow a number of different, even conflicting, institutional realizations. Actual policies are determined in the arena of institutional choice, not by a single, well-defined decision maker, but by a multiplicity of players who constantly attempt to modify the rules of the game; the synoptic model of choice misrepresents the basic logic of the situation.

4. ENVIRONMENTAL POLICY FORMATION: THE CLOSED MODEL

The principal characters in a closed model of the policy-making process are: legislators and executives, governmental agencies, citizens, interest group leaders, and party leaders. Policies are shaped by bargaining and other forms of partisan mutual adjustment among these actors, within the conventions about ends and means, that, to some extent, control the behavior of each participant.²⁸

price system (i.e. both might solve the same equations)"; see Milton Friedman, "Lerner On The Economics Of Control," Journal Of Political Economy, LV, October, 1947, pp. 405-416.

28. C. E. Lindblom, The Intelligence Of Democracy, cit., ch. 6.

In terms of this model, it is easy to see why, in spite of the theoretical advantages of effluent charges and equivalent methods of internalizing pollution costs, environmental legislation in every country relies primarily on a regulatory approach, supplemented by generous amounts of subsidies.

The strength of the preference for regulation/enforcement is revealed by recent developments in the United States. For instance, the 1972 Water Pollution Control Act (the so-called Muskie Bill) has gone even further than previous legislation in the direction of regulation, since it "essentially ends the use of water quality standards as the measuring rod for performance and substitutes standards or regulations regarding effluent control and treatment."²⁹ The same regulatory philosophy permeates the 1967 Air Quality Act (see, in particular, its Title II: National Emission Standards Act), the 1972 Noise Control Act, and the 1974 Safe Drinking Water Act. Perhaps even more indicative, is the fact that attempts by individual legislators to introduce measures giving more emphasis to economic tools, have met with no success, at least so far. The fate of Senator Proxmire's bill establishing effluent charges on industrial polluters at the national level (the "Penny a pound" bill) is symbolic. First submitted in November 1969, it had not yet been reported out of committee in 1973. The bill has not even been reintroduced in this Congress, and although Senator Proxmire apparently thinks that there is some chance for the idea on a state basis, he is not pushing the matter in the Senate. As one of his staff members explained, it is, apparently, dead. On the other hand, the Muskie Bill,

29. A. Myrick Freeman III, and Robert H. Haveman, "Clean Rhetoric And Dirty Water," in A. C. Enthoven and A. M. Freeman, editors, Pollution, Resources, and The Environment, New York: W. W. Norton and Co. Inc., 1972, p. 130.

with its strong emphasis on effluent standards and other forms of regulation, passed the Senate by an 86-0 vote.

In other countries, notably France and the Netherlands, pollution charges have been introduced into water quality legislation. But the charge system, far from becoming the cornerstone of environmental policy that some observers had hoped, has in fact been used as part of a machinery of direct controls; a method for spreading the burden of expenditure among polluters in ways that favor the major industrial interests (e.g. through the mechanism of the flat-rate schedule, see below), rather than a means of efficiently achieving given levels of environmental quality.

Large industrial polluters have strenuously objected to the introduction of effluent charges;³⁰ and when some form of pollution control seemed unavoidable, they have systematically favored the use of standards, licenses, and quotas.³¹

The somewhat paradoxical preference of private industry for government regulations, rather than for an impersonal and automatic system of taxes that would minimize interference with the normal operations of the market, has been

30. See, for instance, J. E. Kinney, op. cit., and Harold C. Lumb, "Fallacies Of A Pollution Tax," Industrial Water Engineering, April 1971, pp. 15-18.

31. On the opposition of German industry and of the states (Laender) to a proposed federal law that would introduce effluent charges, see Renate Mayntz, External Pressures And Conflicts In The Formation And Implementation Of Environmental Policy, Berlin: International Institute of Management, 1975.

explained by Buchanan and Tullock³² in terms of specific advantages that industry can derive under the latter alternative. As these authors show, under a system of emission charges a firm necessarily incurs short run losses; whether it remains in the industry, or shifts its resources to other uses, it will incur a loss in the present value of its potential earnings stream. But under direct regulations assigning production quotas to existing firms, new profits may be present even for the short term, and are more likely to arise after adjustment in plant capacity. In fact, regulation may produce results that are similar to those of a policy of cartelization or of oligopolistic coordination.

However, the possibility of intervening in the regulatory process may be strategically more important than the direct benefits. Infiltration of the machinery of economic regulation by special interests is a recurrent theme in the burgeoning literature on the "crisis of the regulatory commissions." The same phenomenon can be observed, perhaps even more clearly, in the environmental field. A few examples will suffice to show this. In the United States,

"[i]t has been the practice in air pollution control legislation to give substantial representation to the industries that were the most serious polluters. For many years, membership in standard setting boards in many of the states was based on something of a tripartite formula, with industry having approximately one third of the seats and with the public, labor groups, and professionals with specific knowledge or interest in air pollution technology holding the other two thirds. Most of the professionals who were

32. James M. Buchanan and Gordon Tullock, "Polluters' Profits And Political Response: Direct Controls Versus Taxes," The American Economic Review, March 1975, pp. 139-147.

likely to be knowledgeable in air pollution control matters, however, were either employed by industry or were closely identified with industry's point of view. Consequently, many states' air pollution control agencies were for a long time industry-protection oriented, and would not recommend air pollution control measures that were costly or otherwise objectionable to industrial polluters Provisions that require the agency to set air pollution control standards, taking into account "economic feasibility," were especially likely to result in standards that permitted economic factors to outweigh the claims of public health."³³

A similar situation holds in the case of water pollution control:

" It is likely that in water pollution standard setting agencies, just as in air pollution standard setting agencies, the presence of industry board members has hindered the regulatory effort by at least as much as it has advanced it The presence of certain political and economic pressure is clearly visible on the face of certain of the water pollution control statutes. Thus, for example, Pennsylvania makes its act applicable only to sewage and exempts from coverage all wastes from coal mines, tannery and municipal sewage systems existing at the time the act was passed."³⁴

33. Frank P. Grad, "Intergovernmental Aspects Of Environmental Controls" in Richard M. Laska and John Gerba, editors, Managing The Environment, Washington, D.C.: U. S. Environmental Protection Agency, 1973, p. 329.

34. Ibid. p. 332.

In France, the idea of "concerted management" (administration concertée), already made familiar by the practice of the National Planning Commission, found systematic application in the basic 1964 law on water management and pollution control (law no. 64-1245, in Journal Officiel of December 18, 1964): at the national level through the National Water Commission (Comité National de l'Eau, art. 15), at the regional level through the Basin Commissions (Comités de Bassin, art. 13) and the Basin Agencies (Agences Financières de Bassin, art. 14).³⁵

The National Water Commission has advisory functions. Its sixty members, who are appointed by the prime minister for six years, represent the users, the State, and the elected local officials, on an equal basis. Industrial interests are strongly represented in the first group: out of the twenty seats attributed to the users, seven have been assigned to industry (but only three to agriculture, two to private consumers, two to internal navigation, one to tourism, etc.). The situation is even more favorable to the industrial interests in the basin commissions, which are primarily advisory bodies, but whose approval is required to fix the basis of calculation, and the level of the effluent charges proposed by the basin agencies. The categories of users represented in the commissions, and the number of seats attributed to each category, vary somewhat from basin to

35. The law neither fixes the number of basins, nor gives criteria for their definition; it simply introduces the possibility of partitioning the country into a number of jurisdictions including one or more river basins. A (provisional) partition into six river basins (Artois-Picardie, Seine-Normandie, Loire-Bretagne, Adour-Garonne, Rhône-Méditerranée-Corse, Rhin-Meuse) has been introduced, not without controversies, by a decree of 1965 and a "Circulaire du Premier ministre" of 1966.

basin. But, in any case, "[t]he interests connected with industry, broadly interpreted, carry considerable weight in all the commissions, approaching or exceeding the half of the users representation. This is in perfect agreement with the logic of the law of 1964, since industrialists have the primary responsibility for the pollution, and are the ones most affected by the charges."³⁶ Because effluent charges cannot be set without approval of the basin commissions, the smaller representation given to industrial interests in the basin agencies (of the sixteen members of the executive board, eight come from the national administration; the remaining half of the seats is divided between local administrators and different groups of users), does not change the general impression of favorable treatment given by the law to industrial polluters.

One can only speculate about the role played by different interest groups in the definition of the six river basins into which France has been subdivided. This partition of the country into a few large jurisdictions, only in part dictated by considerations of orography and watersheds, has been viewed by some as a way of diluting the effects of popular participation, and as a technocratic encroachment on the autonomies of local communities. Certainly, manipulation of jurisdictional boundaries can be an effective method for blunting the thrust of the most stringent measures of pollution control. Thus, according to Grad³⁷, in the United States,

"there are even a number of instances on record when inventive owners of manufacturing establishments combined to incorporate

36. Alain Fenet, "L'Administration De L'Eau En France," Revue Administrative, 26, July/August 1973, pp. 384-396.

37. F. P. Grad, "Intergovernmental Aspects Of Environmental Control," cit., p. 341.

industrial enclaves as cities or villages, as a defensive measure against the imposition of pollution controls. Thus a highly industrial area with a day time working population of several thousand persons and a night time population limited to a few watchmen may effectively eliminate the possibility of having environmental pollution controls enforced against them."

But it would be a mistake, or an indication of ideological bias, to assume that only industry attempts to modify the institutional framework in its own interest. Citizen groups have long realized that regulatory procedures can be restructured in ways that reward the resources with which they are relatively well endowed (votes and other means of political influence, special connections with opinion-forming media, etc.). The process develops along a fairly regular pattern. Pressures are exerted to secure the right of public participation in environmental decision making. Once the right is granted, group leaders start demanding "real", rather than token, participation. This is then interpreted as implying involvement in the regulatory process at the earliest possible stage, suitable procedural and organizational changes, availability of technical information and expertise and, finally, public financing of participatory activities.

As an example of the results that have been achieved in this way, consider the 1972 Federal Water Pollution Control Act. Section 101(e) of this Act, as amended, requires the Administrator of the Environmental Protection Agency, in cooperation with the states, to develop and publish regulations specifying minimum guidelines for public participation, and assist public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan or program established by the Administrator or by any state under the Act. Responding to suggestions made by citizen groups,

the proposed regulations have been strengthened to the point of indicating that a Regional Administrator may reject a plan or grant application if he finds "inadequate participation."

Under the regulation, each agency must make available for public reference water quality reports and other relevant data, such as grant and permit applications, permits, effluent discharge information, and compliance schedule reports. Public effort in reporting violations of water pollution control laws is also encouraged. An explicit "Summary of Public Participation," to be reviewed and evaluated by the Administrator of E.P.A., by regional administrators, or by other approving officials, must be submitted (a) in the case of regulations and standards required to be published by the Administrator in the Federal Register or required to be published by a State agency in an official form; (b) in the case of statewide or areawide plans; and (c) in the case of applications for grants for construction projects.

The 1972 Act also requires that public hearings be held prior to the establishment of any effluent limitation standards. Public hearings are not the only form of public participation envisaged in the Act. Advisory boards and workshops are other participatory mechanisms. Their costs are treated as allowable expense under federal construction and planning grant regulations. For instance, 75% of the cost of a workshop connected with a specific project can be covered by the Federal Government.

The advantages that politicians and administrators can derive from the regulatory approach have been often pointed out by critics of present environmental policies. Economic interests can be favored through subsidies hidden in tax depreciation formulas or municipal cost-sharing programs, and through the granting or withholding of discharge licenses. The legal and administrative characteristics of the rule-making process facilitate the shifting of the really difficult problems from the federal to the state level, and

from legislature to bureaucratic agencies. Thus, final resolutions of the political conflicts are avoided in favor of piecemeal fragmented decisions that minimize the chances of alienating powerful sections of the policy maker's constituency.

This is a fair description of environmental politics, but the economist's cure does not logically follow from the diagnosis. It has been said that

"[f]rom this perspective, it is little wonder that the economist's prescription of residuals charges has generated modest political appeal. It goes against all of these tendencies. Establishment of a charge system in conjunction with environmental quality standards would resolve most of the political conflict over the environment in a highly visible way where those who would be hurt by such a policy could see what was happening ... It may not be facetious to suggest that the reason residuals charges have not been effectively tried in this country is that they would work."³⁸

They would work, it should be added, in a political system that is radically different from the one we know. As the same authors realize, a "substantial political upheaval" would be probably required for acceptance of the "massive transfer of property rights" entailed by a system of charges. Short of such radical changes, along directions that have never been clearly spelled out, effluent charges can be expected to be subject to pressures and institutional manipulations not dissimilar from those that have been shown to operate in the regulatory process.

38. A. M. Freeman, R. H. Haveman, A. V. Kneese, The Economics Of Environmental Policy, cit., p. 170.

5. CONCLUSIONS: THE INEVITABILITY OF BARGAINING

From the viewpoint of the paradigm prevailing in contemporary economics, the history of social progress could be interpreted as the gradual transition from modes of exchange characterized by isolated bargaining, through competitive bargaining, to the perfectly competitive market, where the exact terms on which exchange takes place can be unambiguously determined. Competition assumes ethical overtones, being "[t]he main curb on a person's bargaining power, and the main pacifying influence on trade in general."³⁹

This outlook has certainly influenced the thinking of many economists working in the field of pollution control. As we have seen, the preference accorded to effluent charges is justified also by their alleged ability to reduce bargaining and political compromise. Conversely, regulation/enforcement is rejected because it "becomes essentially a political process entailing bargaining between parties of unequal power": bargaining over the regulations to be set, over whether violations have occurred, over responsibilities and the steps that should be taken to correct infractions. And because bargaining is recognized as an essential component of the political process, it is a short step to doubt the ability of a pluralistic political system to make wise choices in environmental issues.

I would argue that the naive faith in the fail-safe properties of certain policy instruments, as well as the reluctance to accept bargaining as a method of policy making, can be traced back to the, perhaps unconscious, adoption of an open model of the policy process, in which political decisions are "handed

39. Tibor Scitovsky, Welfare And Competition, London: Unwin University Books, 1952, p. 14.

down from on high by omniscient beings who cannot err."⁴⁰ In spite of all the exorcisms, bargaining remains the only known way of generating viable policies out of a welter of conflicting interests, ill-tested theories and differentially distributed resources.

If it is true that "[t]he most formidable barrier to controlling pollution is probably not technology, population, or public attitudes, but the politics of power"⁴¹, it seems rather pointless to advocate policies that basically deny the political character of environmental problems. Instead, more attention should be given to different ways of achieving alternative distributions of bargaining power to the different participants in the policy process. One such method, incorporated in the U.S. National Environmental Policy Act, consists in empowering any citizen or private organization to sue any private or public body for their environmentally harmful actions, and permitting suits against public officials for not carrying out their responsibility in this connection. Another possibility is class action in courts; when individuals or organizations can sue on behalf of large numbers of similarly affected citizens, the benefit-cost terms of using the courts are significantly altered in favor of the damaged parties. The effectiveness of this strategy has been demonstrated by the experience of Civil Rights legislation in the United States, and is increasingly recognized in other countries. Thus, the German Council of Experts on Environmental Problems, in its 1974 Report, has recommended legislation allowing the possibility of class action (Verbandsklage) for environ-

40. J. M. Buchanan, "Toward Analysis Of Closed Behavioral Systems," cit., p. 12.

41. A. M. Freeman, R. H. Haveman, A. V. Kneese, The Economics Of Environmental Policy, cit., p. 170

mental organizations. A bill to this effect has been introduced by the liberal party of the Landtag in Baden-Wuerttemberg.

Major redistributions of bargaining power can be achieved through public participation in policy making. Here, indeed, is a field where careful analysis of the benefits and costs of different institutional arrangements could pay substantial dividends. Sufficient empirical material is now available⁴² to permit testing of different hypotheses. A related issue is that of the best form of representation of different interests in bodies charged with environmental management responsibilities. For instance, to what extent should representation depend on financial contribution, and how should other types of contribution be valued? Comparative studies in this area would be highly instructive. More importantly, international comparisons of environmental policies would help to dispel beliefs that are sometimes unquestioningly accepted, even in the technical literature. Is it really the "intelligence of democracy" that is failing in the environmental field, when policy developments in a country like the Soviet Union repeat a sadly familiar tale of belated legislation, poorly enforced standards, cross-cutting administrative responsibilities, and behind-the-scene pressures from (government-owned) industry?⁴³

42. See, for instance, St. Ebbin and R. Kasper, Citizen Groups And The Nuclear Power Controversy, Cambridge, Mass.: M.I.T. Press, 1974.

43. C. H. Enloe, The Politics Of Pollution In A Comparative Perspective. New York: David McKay Co., 1975; P. R. Pryde, Conservation In The Soviet Union, Cambridge: Cambridge University Press, 1972; Ivan Volgyes, editor, Environmental Deterioration In The Soviet Union And Eastern Europe, New York: Praeger Publishers, 1974.

Could anybody familiar with European experience in water pollution control accept as a fact needing no proof that a system of effluent charges "would resolve most of the political conflict over the environment," leaving "little room for administrative discretion and bargaining"? We have seen that under the French system, the base and rate of the charges are fixed through negotiation between the basin agency and the basin commission, with its strong representation of special interests. Moreover, the charges are not even directly connected with the amount of pollution discharged, being calculated on the basis of flat-rate schedules, by type of industry, drawn up in conjunction with the users. This arrangement is clearly favorable to the polluters: even though a firm objecting to the flat-rate, can request that the amount of pollution discharged be measured, very few have done so. In the Seine-Normandy basin, for instance, less than 1% have asked that their actual discharges be measured.⁴⁴

Far from attempting to minimize administrative discretion and bargaining and to pursue consistently the goal of integrated water management, the "revolutionary"⁴⁵ French law of 1964, in establishing the basin agencies, carefully avoided any competition with the responsibilities of preexisting administrative bodies and with private activities. In addition to their primary financial functions, the agencies carry out research and act as consultants in the public interest. But they can neither commission nor construct facilities such as reservoirs and treatment plants; even more significantly, they have no re-

44. J. P. Barde, "An Examination Of The Polluter-Pays Principle Based On Case Studies," cit., p. 106.

45. This is how Kneese and Bower, Managing Water Quality, cit., p. 270, describe the law.

gulatory power to establish or enforce pollution standards, these functions being reserved to the Préfets.

Having often referred to the French experience as an important source of counterexamples, it is perhaps appropriate to conclude this paper by quoting in full the conclusions of a detailed study of the institutional aspects of implementation of the water pollution law of 1964:⁴⁶

"Being inspired by an economic rationality accepted by all the interested parties, the action programs of the agencies have often been considered capable of starting a chain of solutions acceptable to everybody. In the limit, administrative responsibilities had only to align themselves to the solutions worked out by the economist. This hope, largely shared at the time of the creation of the basin structures, has been realized only very imperfectly. In fact, even though a large measure of agreement on general directions is always reached, resistances and oppositions appear as soon as the moment comes of deriving the consequences, of making choices and, especially, of paying the charges. The latter have been fixed at modest levels, well below the threshold of economic rationality. Nonetheless, it has been necessary to grant reductions and financial aids for the payments to be made by certain industries. Thus, the agencies have not really succeeded in regulating decisions and behaviors. Even with a progressive increase of the charge rates, economic rationality cannot be the miraculous solution for the field of water management: it overlooks the residual irrationality of any kind of human behavior.

46. A. Fenet, "L'Administration De L'Eau En France," cit., p. 396.

The legislators of 1964 knew this, for they anticipated an extension of administrative powers, and a reinforcement of prevention and repression mechanism."