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ON THE LOGIC OF STANDARD SETTING IN HEALTH AND RELATED FIELDS

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1. SOME DEFINITIONS

In its broadest sense, a "standard," the Encyclopaedia Britannica tells us, is anything used to measure. This paper can be viewed as an attempt to explicate this definition in the context of health and environmental policies.

It seems useful, and perhaps necessary, to start with a brief review of the different ways in which such terms as "norms" and "standards" are used in the fields with which we are concerned. For, while most health planners would probably agree that "the establishment of norms and standards is one of the most important of the methods used in planning the development of the health services,"[1] these terms, like the concept of planning itself, are open to a variety of different and often contrasting, interpretations.

For instance, attempts have been made to distinguish between norms and standards. An official WHO document refers to norms as rules or indicators which are scientifically determined by research, while standards are supposed to be fixed arbitrarily.[2] A similar distinction is made in health planning in the USSR, between "scientifically based" norms, and the so-called design norms and standards, developed primarily on the basis of practical experience. Besides being scientifically based, norms relate more directly to the final outputs of the health system, while standards are seen essentially as input variables. Thus, norms refer to "scientifically established indices of environmental conditions and of the medical care required by the community or by various population groups, as well as of the utilization of health facilities." Health standards are "indices relating to the resources required to meet the needs specified by the norms, i.e. indices relating to the public health facilities and the availability of medical care."[3]

According to Soviet usage the first category includes: environmental, sanitary, and epidemiological norms; norms for the requirements of the community for medical care; and even "productivity norms," e.g. the work load per hour of doctors in various types of medical care. In the second category we find such indices as: organizational standards; standards for the average length of stay of patients in bed and for the average bed occupancy; construction standards; standards for the number of hospital beds, both in the aggregate and for the various specializations; staffing standards; and so on.

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[1] G.A. Popov, Principles of Health Planning in the USSR, Geneva: World Health Organization, 1971, p. 129.

[2] World Health Organization, Health Planning: Report of the Technical Discussions at the Eighteenth World Health Assembly, Geneva: Document A 18/ Technical Discussion/ 6 Rev. 1, 1965, p. 11.

[3] G.A. Popov, op. cit., p. 130.

"Norm" and "standard" are here used, clearly, in a normative sense, i.e. as rules--usually expressed in quantitative terms--in relation to which a given situation may be gauged and judged good or bad. It is, in fact explicitly asserted that "ideally, all norms and standards should be optimal in character," and the hope is expressed that "as the economy of the USSR develops, it will be possible for design norms and standards to be revised so as to make them approach the optimum more closely."[4]

The main part of this paper is devoted to a critical discussion of the assumptions implicit in the above definitions and concepts. Other distinctions are also possible, and have been used. Thus, in functional terms it is possible to identify three major uses of norms and standards:

1) as indicators of need, in terms both of inputs and outputs of the health system, or of a subsystem, and of particular groups of people to whom specific services are directed;

2) as rules of action or policy constraints[5] imposed upon a variety of agents, public and private (e.g. environmental and safety standards); and

3) as tools of control, to ensure that plans are carried out according to prescriptions, and to measure the extent of possible deviations between objectives and actual performance.

Applying other taxonomic criteria (e.g. the method used in deriving the standards: statistical sampling, expert opinion, laboratory research), still other classifications are of course possible, but are not immediately relevant to the present discussion. It should, however, be noted that in the western literature the term "standard" (which largely replaces "norm") is often used in a much broader sense. This is particularly true in the environmental field, where the term may be applied to any kind of controlling mechanism on the utilization of environmental services, e.g. taxes and subsidies as well as direct controls on emissions or quality deterioration.

2. STANDARDS AS INDICATORS OF NEED FOR HEALTH

It seems appropriate to begin a critical discussion of concepts and assumptions employed in the process of standard setting, with an examination of the use of standards as indicators of need. Indeed, in spite of its apparent simplicity, "need" is one of the most ambiguous concepts used in planning and policy analysis. In the first place, it is not usually clear whether the alleged "needs of society" reflect the authoritative decisions of the political authorities, the wishes of a majority of the citizens (perhaps revealed by "manifest demand"), the judgments of a restricted group of experts and administrators, or the values of an enlightened and concerned elite. Also, need can be assessed in (more or less) objective terms 1) when it refers to some minimal prerequisites of individual or societal survival, or 2) when it is expressed as a function of the expectations that are generated by a given level of socioeconomic and technological development. In the first case, standards usually take the form of lower bounds (minimum levels); in the second, minimum levels are often criticized as being too modest and conservative, and discussion focuses on the definition of "optimal" standards.

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[4] Ibid., p. 131.

[5] On the concept of policy constraint, cf. G. Majone, "The Feasibility of Social Policies," Policy Sciences, forthcoming.

The notion of optimality immediately evokes questions of costs, benefits, and constraints. Many discussions of "medical needs" leave the impression that these are needed regardless of financial and social costs, and of institutional and political constraints. One persistent source of confusion is the fact that most doctors and public health planners think about needs in total, rather than marginal, terms. But it is clear that with given resources and technical possibilities, higher levels of one standard (expressing a certain degree of satisfaction of some social need) inevitably imply lower levels for other standards. For instance, high standards of purity for air will entail--except for the possibility of recycling waste material--lower levels of quality for water and land, since waste cannot be destroyed but only transformed in different ways and disposed of through different environmental media. In fact, the stringent regulations recently imposed by air pollution control agencies in many cities have had the consequence of producing tons of additional solid wastes which could not be adequately handled by the sanitation departments.

To make this point completely clear, suppose an environmental agency has to allocate a given budget between water (W) and air (A) protection. Of course, restriction to these two media is dictated only by the desire to use a 2-dimensional graphical representation (one could interpret the vertical axis as indicating "other environmental media"). Also for the sake of simplicity, I shall assume that the quality of each of the two media is expressed by a single scalar measure, say, dissolved oxygen concentration (DO) in the case of water. Thus, the scale on the W-axis is defined in terms of DO units (mg/l). With a given budget and technical possibilities, the agency can achieve either the quality level OW for water, or level OA for air, or any combination of conditions for water and air shown along the possibility boundary AeW (Figure 1).

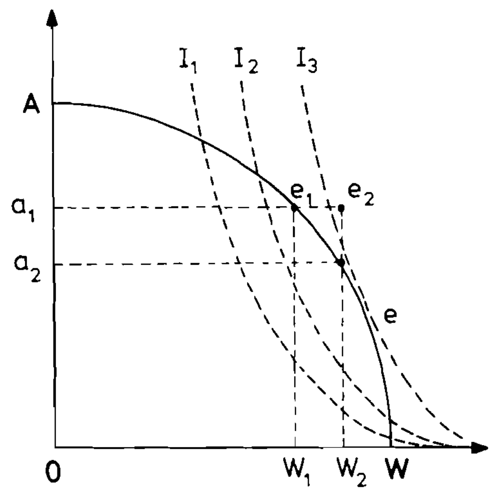

FIGURE 1.

Suppose that the present quality levels for water and air are w_1 and a_1, respectively, but that considerable pressure is being exerted on the agency to raise the quality of the water at least to level w_2. The diagram makes clear that the "need" for clearer water can be satisfied, under the assumed conditions, only by reducing the quality standard for air (from a_1 to a_2). In order to weigh the advantage of purer water against the (opportunity) cost of foregone cleaner air, one would have now to introduce a utility indicator I, whose level curves represent alternative combinations of water and air quality levels that are considered equivalent in utility terms. The prescription would then be to choose the combination of standards corresponding to the point on the possibility curve--point e in Figure 1--at which the slope of the highest attainable iso-utility line equals that of the AeW curve.

But even without introducing all the subtleties of utility analysis, we can use our simple diagram to give visual representation to one of the most common errors in standard setting, namely the attempt to achieve the highest possible standard in a certain field, for instance in a particular environmental medium, without regard to its opportunity costs. It is clear that, in our example, the choice of the OW level for the water quality standard would be as disastrous as a choice of OA for air.

Of course, expert health planners are quite aware of this danger. A Soviet expert writes: "A common fault in the preparation of standards for the requirements for medical care is to study the various forms of such care in isolation, e.g. to study hospital care without taking into account the fact that different forms of outpatient care are also available. Standards obtained in this way are unsuitable for use in health planning."[6]

What is not so clearly perceived is that the fault is the direct consequence of applying that "method of priorities" which the same author has previously indicated as a necessary tool of health planning. No hierarchy of needs or list of priorities can solve the allocation problem of the decision maker; and, as the preceding discussion suggests, the setting of standards is to a large extent an allocation problem. All needs are simultaneously sensed and the policy maker cannot, and should not, wait until one need is satisfied before beginning to be concerned with the other items on his list of priorities.[7]

Many standards used in health planning, e.g. hospital bed availability and staffing standards, are supposedly determined on the basis of revealed demand (as measured, for instance, by number of hospital admissions or hospital beds used per 1000 population, by increases in the waiting lists, etc.) The underlying assumption is that the demand for hospitalization is exogenously determined. Now, planning methods based on manifest demand are analytically appealing because they can be directly formulated in terms of well-developed queuing theory models. But these methods are open to a basic objection: they ignore the effect of available supply on hospital admission rates, and on the average duration of stay per case. This phenomenon is particularly evident in countries whose health systems preclude the rationing of the health resources through the pricing mechanism, while preserving the doctor's professional freedom in the determination of the appropriate treatment of each case.

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[6] G.A. Popov, op cit., pp. 131-132.

[7] For a good discussion of the ambiguities inherent in the priorities method, and of the special cases in which it is a valid criterion of choice, see C.J. Hitch and R.N. McKean, The Economics of Defense in the Nuclear Age, Cambridge: Harvard University Press, 1960, especially pp. 122-123. Also A.J. Culyer, R.J. Lavers, and A. Williams, "Social Indicators: Health," in Social Trends, No. 2, 1971, pp. 31-42.

3. THE COST-BENEFIT APPROACH TO STANDARD SETTING

The preceding discussion can be summarized by saying that a rational approach to the setting of a standard requires an explicit valuation of the marginal trade-offs between it and other inputs (including other standards) relating to the same indicator, or group of indicators, of state of health. Such valuations correspond to the slopes of the level lines of the indicator as they pass through the possibility boundary (AeW in Figure 1) vertically above each possible level of the standard under discussion.

The important point is that any standard whatsoever--whether it relates to health, to the urban or natural environment, to property damage, or to aesthetic values--can always be expressed as (a function of) a cost-benefit ratio. It is impossible to set standards and norms at such levels as would eliminate any hazard to human health, or satisfy any conceivable need. Even in the most technical fields recourse to human judgment is unavoidable; risks must always be taken, needs have to be matched against resources and technical and institutional constraints, and discount rates for future benefits have to be decided upon. Thus, norms and standards relating to the quality of life necessarily represent a compromise between aspirations and considerations of feasibility. In the last analysis, the setting of a standard is a socioeconomic decision, an implicit valuation of the utility of human life, health, and well-being.[8]

Two important consequences follow from a cost-benefit view of standards. First, the distinction between "scientific" and "arbitrary"[9] standards turns out, upon closer examination, to be untenable. No standard or norm can be established on purely scientific or technical grounds (even assuming that a consistent body of relevant and well-tested knowledge is available, which is by no means the usual case in the health and environmental fields), any more than social goals can be deduced from factual propositions. On the other hand, no standard is actually set in a purely arbitrary fashion, that is to say, without some implicit or explicit evaluation of benefits, costs, and risks.

This brings us to the second point. Standards are set all the time, in the most varied fields of human life and activity. Each of them represents, as I have already indicated, a particular value of a cost-benefit ratio whose terms, in the numerator and the denominator, can be identified with reasonable precision in any specific case. Of these terms, those relating to cost can normally be quantified without too much difficulty, although there may be some uncertainty concerning the appropriate discount rate for capital. Hence, given the particular value s_0 that has been chosen by the responsible authorities, we can, in principle and often also in practice, solve the equation

$$s_0 = f(C/U) \quad ,$$

for U, in order to get the utility implicitly attached to life, to health, or to whatever other value the standard is supposed to protect.

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[8]This part of the discussion relies heavily on sections of my paper "The Feasibility of Social Policies," Policy Sciences, forthcoming.

[9]World Health Organization, op. cit., p. 11.

Such calculations have been performed, for instance, in the field of traffic safety,[10] and there is no reason why they cannot be replicated in the health and environmental sectors. Making these valuations explicit can produce consequences of practical significance: a) the decision maker becomes aware of the opportunity costs of setting standards at different levels; and b) it helps to bring the problem of the mutual consistency of different standards--both at the national and at the international level--at least one step closer to a rational solution.

With the proliferation of standards and administrative rules of a similar character, the question of consistency is becoming important and deserves much more attention and systematic investigation than it has received so far. In any given country, one can find enormous variations in the implicit valuations of life and health that are embedded in official and semi-official standards, both over time and across different fields of activity. For instance, in the United States during the Second World War the officers responsible for setting design standards insisted upon heavy armor for bombers, which in turn required larger aircraft. Subsequent analysis revealed that the requirements implied values of several million dollars per life saved. By contrast, in the late sixties, military aircraft were designed almost without any regard to vulnerability, with an implicit value for human life fairly close to zero. Similar variability has been found in the implications of US Federal Aviation Agency regulations for airline safety, in safety features of highway design, and in public health programs.[11]

Internationally, the discrepancies are even more striking. A good example here are the standards for maxium concentrations of vinyl chloride monomer (VCM) in industrial plants. The first restrictions--500 parts per million (ppm) in the US and UK--were imposed not because of VCM's toxicity, but rather because of its inflammability. After strong indications began accumulating that VCM may be carcinogenic, and the discovery of a causal link with acro-osteolysis (an apparently reversible disease affecting the skin and bones of toes and fingers), the upper limit was set at 200 ppm in the UK, while the value of 500 ppm remained in force in the United States. In Germany, on the other hand, a maximum workplace concentration of 100 ppm was established on the basis of research carried out at Dow Chemical Co. On the very same scientific evidence, Dow itself set its standard at 50 ppm, as early as 1961.[12]

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[10] Good examples can be found in H. Levy-Lambert and H. Guillaume, La Rationalisation des Choix Budgetaires, Paris: Presses Universitaires de France, 1971, especially chapters 5 and 7. Also see M. Jones-Lee, "Valuation of Reduction in Probability of Death by Road Accident," Journal of Transportation Economics and Policy, Vol. 3, 1969, pp. 37-47.

[11] Cf. Martin J. Bailey's comments on T.C. Schelling's "The Life You Save May Be Your Own," Public Expenditure Analysis, S.B. Chase Jr. ed. Washington D.C.: The Brookings Institution, 1968. Also, C.J. Hitch and R.N. McKean, The Economics of Defense in the Nuclear Age, op. cit. p. 196; H. A. Thomas, Jr., "The Animal Farm: A Mathematical Model for the Discussion of Social Standards for Control of the Environment," The Quarterly Journal of Economics, February 1973.

[12] L. McGinty, "Science Paused and 17 Died," New Scientist, 13 June 1974, pp. 675-676. (I owe this reference to the kindness of Mrs. Gillian Kelley of IIASA.)

4. SOME GENERALIZATIONS

The cost-benefit approach to standard setting represents a significant improvement over current practices. It is not, however, the most general approach to problems of this kind, as has been sometimes asserted.[13]

Generalizations can be pursued along different lines. I shall mention here the two extensions of the basic cost-benefit framework that appear most interesting to me, even though the practicality of the first proposal is open to serious doubts, given our present level of knowledge.

The technique of cost-benefit analysis is always applied in the context of a partial equilibrium model. The calculations of the costs and benefits of the consequences of a particular alternative are performed under the assumption that the wider economic and institutional environment remains essentially unaffected by the decision. This assumption is often quite unrealistic. One could, therefore, try to extend the cost-benefit approach to standard setting, by operating with a general equilibrium model which includes also an environmental and health sector. A.V. Kneese and R.C. d'Arge have, in fact, attempted to examine the problem of environmental standards in the setting of a general equilibrium model. They have been able to derive explicit environmental standards via taxes on final products in such a way that, in principle, the externalities due to environmental pollution could be eliminated, while assuring that the Pareto optimum conditions are met everywhere in the economy.[14]

The analysis is based on the assumption of competition, with consequent satisfaction of the Pareto conditions (prices equal to marginal social costs) throughout the economy, except for environmental services. While it would be possible, at least in principle, to extend the model by adding the health services, it must be admitted that we do not know enough about the nature of the production functions and of demand-supply relationships holding in the health sector, to make the approach feasible at present. Moreover, the model would not be applicable in countries where the provision of health services has been wholly or partially divorced from the working of the price mechanism and where, as a consequence, the Paretian value judgment has been, in fact, rejected. Thus, even if the numerous efforts now under way to develop econometric models of the health system, were to produce practically relevant results in the near future this would not be of much assistance for the kind of generalizations I have been discussing.

A different, and pragmatically more significant, generalization can be achieved by viewing the process of standard setting as a particular type of decision making under uncertainty. As a matter of fact, many environmental standards are expressed in what are essentially probabilistic terms. Air and water quality standards prescribe maximum permitted values for long-term mean concentrations, together with provisions to the effect that the average concentrations over shorter periods must not exceed given levels with more than a certain frequency. For instance, the primary air quality standards for the protection of public health set by the US Environmental Protection Agency on April 30, 1971, put the upper bounds for sulfur oxides at 80 mg/m^3 = 0.03 ppm for the annual arithmetic mean, and at 365 mg/m^3 = 0.14 ppm for the maximum 24-hour concentration not to be exceeded more than once per year.

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[13] See, for instance, A.J. Culyer, R.J. Lavers, and A. Williams, op. cit.

[14] A.V. Kneese and R.C. d'Arge, "Pervasive External Costs and the Response of Society," in the Analysis and Evaluation of Public Expenditures: the PPB System, Washington D.C.: US Government Printing Office, 1969, Vol. 1, pp. 87-115. Also, A. Myrick Freeman III, R.H. Haveman, A.V. Kneese, The Economics of Environmental Policy, New York: John Wiley and Sons, 1973.

Water standards have to be met under the average minimum flow for a consecutive period of time (usually one week) to be expected once in every ten years, etc.

Moreover, in the case of certain air pollutants--e.g. carbon monoxide, hydrocarbons, nitric oxide, nitrogen dioxide, nitrogen oxides, oxidant, and sulfur dioxide--statistical distributions of average, median, and maximum measured concentrations have been calculated.[15] These estimates allow one to calculate how often the concentrations will exceed given levels, and hence to assess the risk that the concentration temporarily rises to dangerously high levels.

There are many ways of structuring the uncertainty surrounding the process of standard setting. The examples just given suggest a formulation of the problem in terms of a chance-constrained programming model.[16]

> Let $x_1, x_2, \ldots, x_n$ be decision variables that can be manipulated to attain specified levels of quality standards $s_1, s_2, \ldots, s_m$. In a case of water pollution control, for example, the standards may express (perhaps in an aggregate way) different characteristics of water quality, such as dissolved oxygen concentration, coliform bacteria density, taste and odor, temperature, radioactivity, and so on. Denote by a_{ij} the effectiveness of x_i with respect to s_j. If the required levels of the s_j are stochastically determined--e.g. because of stochastic variations in stream flows, waste flows, weather conditions--one possible version of the standard-setting problem is the following:

$$\text{minimize} \quad w = \sum_{i=1}^{n} c_i x_i \quad ,$$

subject to

$$\Pr\left(\sum_{i=1}^{n} a_{ij} x_i \geq s_j\right) \geq \Pi_j \quad ,$$

$$x_i \geq 0, \; i = 1, \ldots n; \quad 0 \leq \Pi_j \leq 1, \; j = 1, \ldots m \quad ,$$

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[15] For more details, see S.Å. Gustafson and K.O. Kortanek, "Mathematical Models for Air Pollution Control: Determination of Optimum Abatement Policies," in Models for Environmental Pollution Control, R.A. Deininger ed. Ann Arbor, Mich.: Ann Arbor Science Publishers, Inc., 1973, ch. 13.

[16] To the best of my knowledge, no application of chance-constrained programming methods to standard setting has appeared in the literature, although R.A. Deininger has apparently discussed the relevance of this model in an unpublished doctoral dissertation. Deterministic optimization models for standard setting have, however, been considered; see, for instance, the review paper by W.O. Spofford, Jr., "Total Environmental Quality Management Models," in Models for Environmental Pollution Control, op. cit., ch. 19 and the Gustafson-Kortanek paper mentioned in the preceding note.

where Pr stands for probability and c_i is the unit cost associated with decision variable x_i.[17] Using a zero order decision rule (all the x_i values are assigned <u>ab initio</u>), the problem can be immediately reformulated in a deterministic equivalent version. Let F_j be the distribution function of the population from which the values of s_j are sampled. Then $F_j^{-1}(\Pi_j)$ is the Π_j-fractile of s_j--i.e. Pr $(s_j \leq F_j^{-1}(\Pi_j)) = \Pi_j$--and we get the equivalent linear programming problem:

$$\text{minimize } w = \sum_{i=1}^{n} c_i w_i \quad ,$$

subject to

$$\sum_i a_{ij} x_i \geq F_j^{-1} (\Pi_j) \quad ,$$

$$x_i \geq 0, \; i = 1,\ldots,n \quad .$$

The dual version of the problem is particularly significant for the logic of standard setting:

$$\text{maximize } z = \sum_{j=1}^{m} F_j^{-1} (\Pi_j) y_j \quad ,$$

subject to

$$\sum_{j=1}^{m} a_{ij} y_j \leq c_i, \; i = 1,\ldots,n$$

$$y_j \geq 0, \; j = 1,\ldots,m \; .$$

The optimal y_j values represent the evaluations imputed to the risk indicator or Π_j or, rather to the corresponding fractile. Like the w value for the objective function in the primal problem the z value in the dual is expressed in monetary terms (if the costs are so calculated).

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[17] In the water pollution control example, x_i could be the amount of waste removed per day in pounds of BOD; c_i would then be the cost of removal of x_i. In fact, two more suffixes should be attached to the variables and coefficients of the model to indicate the source of pollution and the point at which the measurement is made; the a_{ij} would represent "transfer coefficients." Given the purely suggestive nature of the present discussion, complete rigor seems out of place. For the same reason, I do not enter into details concerning such practically important issues as the scaling of the quality standards.

But while the c_i refer to treatment costs (or to the cost of whatever actions are needed to attain a given quality standard), the $F_j^{-1}(\Pi_j)$ refer to the fractiles needed to ensure satisfaction of the corresponding quality standard with the preassigned probability Π_j.[18]

The chance-constrained programming model is, of course, linear. The linearity assumptions hold, for instance, for constraints based on models for dissolved oxygen of the Streeter-Phelps type, but certainly not in many other situations. When serious non-linearities are present, it may be preferable to incorporate the quality standard constraints in the objective function via a penalty function approach.[19]

5. ALTERNATIVES TO STANDARD SETTING

A qualitatively different type of generalization is introduced in the discussion by asking whether standards are really needed, or are the best way, to achieve a given policy goal. The possibility of regulating essential aspects of social life by administrative rules appeals strongly to the rationalistic bias of the social planner. To him, standards and norms are, in the words of a recent United Nations publication, "an element of quantitative precision in the determination of the goals and means of social policy."[20] However, serious doubts have been raised concerning the possibility of coping, by means of standards and administrative regulations, with the technological and organizational complexities of today's health systems.[21]

The conceptual difficulties and ambiguities inherent in the use of standards as indicators of needs have already been discussed in the first part of this paper. As rules of action or policy constraints, standards and norms tend to replace policy objectives in the minds of health planners. There are also serious problems connected with the inflexibility of standards (their formal codification introduces essential discontinuities in the decision process), their excessive uniformity, and the frequent uncertainties about the legal and administrative means of enforcement[22] with a corresponding uncertainty about implementation costs.

The effectiveness of standards as tools of control can also be questioned. Because of socioeconomic growth and technical innovations, standards quickly become obsolete, and thus useless as a device to measure the discrepancy between goals and achievements. If, on the other hand, they are revised frequently, they lose one of their main advantages, namely that of providing the health planner and the administrator with fixed reference points and benchmarks.

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[18] The close connection between chance-constrained programming and cost-effectiveness has been pointed out by A. Charnes, W.W. Cooper, and G.L. Thompson, "Chance-Constrained Programming and Related Approaches to Cost Effectiveness," Pittsburgh: Carnegie Institute of Technology, Graduate School of Industrial Administration, Management Sciences Research Report No. 39, April 16, 1965.

[19] As suggested, for instance, by W.O. Spofford, Jr., op. cit.

[20] United Nations European Program for Social Development, Rapport du Groupe d'Experts sur les Methodes Utilisées pour la Détermination des Normes dans la Planification des Secteurs Sociaux, New York: SOA/ESPD/1, 1972, p. 14.

[21] H.L. Blum and Associates, Notes on Comprehensive Planning for Health, Berkeley: School of Public Helath, U. of Calif. 1968, p. 433.

[22] See, for instance, E.J. Cleary, The Orsanco Story, Baltimore: The John Hopkins University Press, 1967, especially pp. 56-59.

When the standard applies to a variety of more or less autonomous agents, the problem of control merges into that of devising suitable incentives, so that the agents will be motivated to adopt types of behavior that are compatible with overall policy objectives. Many standards have built into them features that make their implementation particularly costly, in monetary and/or psychological terms, for the target group whose behavior they attempt to modify. Safety standards provide many examples of built-in disincentives. Industrial safety standards often make the accomplishment of certain tasks so difficult or disagreeable that the operatives have strong incentives to disregard them.

A law requiring every car owner to install expensive safety devices essentially levies a tax to promote the purchase of certain types of safety equipment. Some car owners may have preferred to economize on these devices, perhaps using the savings to purchase a new--and safer--automobile more frequently than would be possible if everybody is forced to invest heavily in safety devices.[23] Similarily, it can be shown that some building standards may actually lower the overall quality of the housing accessible to lower income groups. Again, consider the requirement that all cars be equipped with devices to reduce the level of pollutants escaping from the engine. If the devices shorten the life of the engine and require frequent repairs, car owners have incentives to make the devices ineffective.

The point I wish to make is that standards are not ends in themselves, but only one of many tools that can be used to accomplish particular policy objectives. The spectrum of possibilities ranges from outright prohibition of certain types of activities or behaviors that are considered particularly harmful in individual or social terms, to the provision of a system of penalties and rewards that essentially leaves the final choice to the responsibility, and self-interest, of each decision maker.[24] Standards, administrative regulations, and direct public action should be viewed as discrete, intermediate stages along an essentially continuous spectrum.

Each of these alternatives presents advantages and disadvantages that should be carefully assessed before deciding in favor of a particular solution. In fields as complex as health and environmental control, important policy objectives can probably be achieved only by a mixture of approaches. While the weights to be attached to each element in the combination will probably depend, to a large extent, on the institutional framework in which the decisions are taken, it does not seem wise for any decision maker to rely only on the more direct forms of regulation.

I have restricted my critical remarks to the problem of standard setting because too much faith is put, especially by health planners, in this particular policy tool. Only by dispelling the mystique that surrounds the standard setting process can we rationally evaluate its benefits and costs, both internally and with respect to alternative approaches. The question of the mutual consistency of different standards; the reasons for the significant international differences in standard setting that persist, even when there is a substantial agreement on the scientific data base; the design of flexible standards for systems subject to large stochastic variations; the assessment of policing costs, and of the

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[23] H. Demsetz, "Contracting Cost and Public Policy," in The Analysis and Evaluation of Public Expenditures: The PPB System, op. cit., vol, pp. 169-170. Vol. 1,

[24] For a good discussion of the role of incentives at every stage of policy making, see C.L. Schultze, "The Role of Incentives, Penalties and Rewards in Attaining Effective Policy," in the Analysis and Evaluation of Public Expenditures: The PPB System, op. cit.

distributional and efficiency consequences of standards;[25] public participation in the standard setting process: these are only some of the many interesting problems that have yet to be systematically explored. However, a necessary prerequisite to any meaningful analysis is the clear realization that standards are neither arbitrarily set, nor uniquely determined by scientific and technical considerations. They represent, rather, socioeconomic decisions whose far-reaching consequences we are only now beginning to appreciate.

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[25]For example, it has been argued that the emission standards for coal burning power plants set by the US Environmental Protection Agency in 1971, may cause a massive shift to low-sulfur coal in the very near future. It is also possible that utilities may shift to low-sulfur oil and natural gas in order to meet the standards; cf. C.R. Aleta, "A Critique of the New EPA Emission Standards for New Stationary Sources," Ithaca, New York: Cornell Energy Project, Paper no. 71-11, October 1971. It is clear that a switch to low-sulfur fuels would compound the already serious problem of supply of these fuel sources, but the full implications of these developments, in terms of economic efficiency and even of redistributional effects remain to be worked out.

Remarks of the Discussant, Mr. Gros

Mr. Majone's paper suggested to Mr. Gros a number of problems in the setting of standards:

1) the difficulty in catering to uncertainties. The usual phenomenon we observe in standard-setting as further information dispels uncertainty is a tightening of standards. Assuming that mean estimated hazard remains constant, one would expect more stringent standards earlier when the uncertainty is higher;
2) the conflicts of interest among agencies that often have significant impact upon the standards derived;
3) the observation of Starr that public acceptance of risks is variable. People are more willing to take risks voluntarily upon themselves than they are willing to accept risks exogenously imposed. Advertising campaigns can increase acceptance of reasonable risks;
4) the methodological difficulty in setting separate standards for pollutants whose chief harm comes through synergistic effects; and
5) the delicate question of whose utility functions should be consulted and used for guidance.

Comments upon Standards

Conference participants offered a number of reactions to the points brought forward by Mr. Majone:

1) that standards are not scientifically determined and, perhaps, cannot be;
2) that the many considerations for appropriate standard-setting require a good communications system and the application of systems analysis to tailor standards to specific environments;
3) that attitudes toward standards may reflect sociological attitudes toward rules and authority generally;
4) that enforcement costs must be considered. The unenforced standard is no standard;
5) that certain phenomena may not be appropriate for regulation via standards. The new US policy of reviewing all treatments applied to patients raises such questions as whether it makes sense to apply standards to tonsillectomies; and
6) that flexible standards have drawbacks. One member felt that the flexible standard is no standard and that Mr. Majone had been insufficiently meticulous in considering this point.

Responses by Mr. Majone

Mr. Majone agreed upon the importance of enforcement and of tailoring standards to specific environments. He pointed out that the methodological and philosophical difficulties of assigning utility to the human life has plagued the setting of standards. Mr. Majone characterized standards as one important policy tool for dealing with the complexity of the world and its systems. The simplicity of standards in relation to alternative policy levers enhances their utility.