

DISCUSSION

WILLIAM J. BAUMOL: The three very fine papers presented by the speakers, since they are essentially expository in nature, call for little discussion. I shall therefore use Professor Strotz's words as an excuse and an occasion for a confession.

In shouting "bravo" to his admirable statement on the measurability of utility I have, to a considerable extent, retreated (and, I might add, retreated in very good company) from a position which I held earlier. (See my "The Neumann-Morgenstern Utility Index—an Ordinalist View," *Journal of Political Economy*, February, 1951.) Under the patient tutorship of Professors Friedman, Marschak, and Savage, as well as others, I have seen the light. I see now that there exist most persuasive definitions of rationality which lead us to the conclusion that the consistent calculating man will choose and prefer in a way which can be described by a Neumann-Morgenstern index of utility. In other words, such an index will permit us to make valid predictions about the behavior of this rational "calculating boy." For the N-M index straitjackets preferences—given his ranking of all riskless possibilities and only one of those sets of lottery tickets which all have the same given winning prize (say \$100) and the same given booby prize (say zero), it permits the individual no choice on any other risky proposition—all such propositions are preranked for him! But it turns out that this is not really as presumptuous as at first appears. A man who is rational in the sense defined by Marschak in "Rational Behavior, Uncertain Prospects, and Measurable Utility" (*Econometrica*, April, 1950) (or by I. N. Herstein and J. W. Milnor in "An Axiomatic Approach to Measurable Utility," *RAND Paper*, P-139, ditto) will have no quarrel with this choice. The choices made for him by the index are exactly the choices he would have wanted to make himself if he had been clever enough to go through the difficult computations correctly. That is essentially what I had not seen when I wrote my paper on this subject.

However, this is not the end of the matter. Really it is only the start. In this connection there are four points I should like to make, most of which would, I think, be accepted by all participants in the argument.

1. Just because a superclever rational man will behave in the way required by the index, it does not follow that real men do so. We are left with the infinitely more important problem of empirical testing on which only beginnings have been made. True, we are frequently willing to accept a rationality hypothesis as a basis for economic theorizing. But because of the complexity of the required computations and the apparent importance of whim, hunch, and passion, there may be distinctly less a priori plausibility to an assumption of rationality in the analysis of gambling behavior, say, than in the theory of the firm. Here especially, then, empirical testing would seem to be required before we can be convinced of the usefulness of the construction.

2. The utility measured by the index is, as Strotz indicates, not the utility the neoclassicist spoke of and whose second partial derivatives he introspected to be negative (diminishing marginal utility). It is therefore perhaps un-

fortunate that the term has been and continues to be applied to the index. Much of the confusion in the discussion might have been avoided had other nomenclature been used.

3. Old-fashioned cardinal utility is neither meaningless nor pointless if not taken too literally. It may be indispensable for some problems of group decision making and welfare economics. Moreover, we are willing to accept rough calculations of the sort required, in our everyday living. The mother who decides which crying child to take care of first may have made a crude interpersonal comparison of (cardinal) utility. Similarly, we may be prepared to agree that a holdup murder which nets its perpetrator twenty cents has gained him less than it cost the victim. Judgments of this sort are relevant for every political decision which benefits some and is deleterious to others. Incidentally, as Clifford Hildreth has indicated in "Alternative Conditions for Social Orderings" (*Econometrica*, January, 1953), unwillingness to make this sort of interpersonal comparison, which is manifested in taking into account no more than the rankings (ordinal preferences) of the members of the community, is a source of the difficulties which Kenneth J. Arrow has brought to our attention in *Social Choice and Individual Values* (Wiley, 1951).

4. It is possible (this is no more than a hypothesis) that the psychology of gambling is such that rationality as defined straitjackets preferences less effectively than might at first appear. (This was first suggested by Samuelson in an unpublished paper.)

As I have said, the N-M index automatically ranks all gambles for an individual given little more than his ranking of the prizes (winning and booby) and the relevant probabilities. Thus, if we have a lottery ticket which offers a fifty-fifty chance at winning \$10.00 or losing \$2.00, and have a figure giving the N-M utility of the \$10.00 gain and of the \$2.00 loss, we can compute the utility of the gamble. Knowing these utility numbers for any two gambles, they are automatically ranked for us. It would thus appear that, knowing only about the attitude of the rational man toward all possible riskless gains like the certain gain of \$10.00, all gambles are ranked for him. However, a gain of \$10.00 may mean different things in different circumstances. For example, the gambler may get much more joy as he walks away from the betting window out of the \$10.00 he won on a long shot than from \$10.00 earned by working, or even from \$10.00 won on a pretty sure thing. If this is so, for him the utility of the prizes from gambles will vary with the terms of the gamble. To rank his preferences on all gambles with the aid of the N-M index it is not enough to ask him questions about his attitude toward different sums of money. We must ask him many other questions, for each gain specifying the various ways in which it may accrue to him. In particular, for every gamble we must ask him questions about his attitude toward its peculiar possible outcomes. We cannot as it were rank it behind his back. That is to say, we cannot deduce his ranking of the gamble from his ranking of things which can be obtained by him without his having undertaken that gamble. If this empirical hypothesis is true, then the straitjacketing of preferences (i.e., the possibility of predicting) which the N-M hypothesis results in for the rational man (in the sense defined) remains formally valid but much of its force is lost.