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EXPERIMENTING WITH PUBLIC GOODS PRICING:

A COMMENT

Edward H. Clarke

I applaud Scherr and Babb's pilot efforts to experiment with individual behavior in a public goods setting. Some theoretical aspects of the pricing systems used in these experiments, however, might add another perspective to their results as well as direction to, and different results from, future experimental efforts along these lines.

The Scherr/Babb experimental results might have been closer to those predicted by theory had they provided participants with more explicit information as to the implications of various revealed demand strategies and had they linked "payoffs" more directly to the welfare gains (and losses) that result from such strategies. In the discussion below, I outline the nature of such information and "payoffs" as they might be applied in a modified experimental setting. This includes experiments, both with and without a prohibition against side arrangements, crucial to an effective comparison of my system with that of Loehman and Whinston.

I. A Modified Experimental Setting

Beginning with a prohibition against such side arrangements, a run of the initial experiment might indicate to each participant how he could maximize his own welfare in each of the 14 situations, assuming that the other participant behaves independently. I have indicated how such independent adjustment equilibria are determined under the voluntary arrangement in my article and will outline breifly their determination under the Loehman-Whinston system below.

Associated with each of these equilibria is a welfare gain to the individual participant and a larger offsetting welfare loss to his opponent.[1]

The appropriate "pay off" would be determined by adding or substracting the appropriate welfare gain or loss, together with each participants' cost share under the given pricing system, from his initial endowment ($10 in the Scherr/Babb experiment) during the course of the actual experiment.

Each participant in this case would specify his true demand for each public good at the *beginning* of the actual experiment and the appropriate welfare gains and losses would be determined with respect to both his and the opponent's true and revealed demands for each of the fourteen iterations of the actual experiment.[2]

Given the interjection of *explicit* welfare gains and losses into each individual's decision calculus, I would expect dramatically different results from those observed in the Scherr/Babb experiment. Specifically, the hypotheses suggested by theory are: (1) no misrevelation of preferences under my system; (2) some misrevelation for reasons indicated below under the Lochman-Whinston system; and (3) a persistent tendency to underreveal preferences, given the voluntary system.

Stragetic Behavior in the Loehman-Whinston System. Their system is an example of that kind of pricing approach, discussed in my article and elsewhere, which would have the government speeify assigned tax-prices which would remain otherwise fixed unless modified, subject to the explicit agreement of the participants. Such a system, however, does generate incentives for strategic behavior, although Buchanan has noted that when the way is opened for negotiations, and without strategic behavior, the negotiations process may converge toward optimality in small number cases.[3]

But with or without negotiations, the incentives in such cases to misreveal preferences may be substantial. Given the assigned tax-prices, each participant seeks to equate his own marginal benefit with his own assigned price. With reference to

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[1] Under my proposed pricing system, there is no divergence of independent adjustment equilibria from the optimum output and thus no welfare gains to be made from a misrevelation of preferences. See Clarke, "Multipart Pricing of Public Goods", *Public Choice* XI (Fall, 1971) 17-34.

[2] The proposed experiment would thus substitute some of the "experimental" realism injected by Scherr and Babb for a more tightly controlled experiment that includes prior information about the effects of various pricing systems and demand revelation strategies, and assumes perfect knowledge of "true" preferences by the individual participant and the experimenter.

It is particularly important to note that prior information on the results of various demand strategies does not require information as to the complexities or operations of the pricing systems themselves. In particular, the Clarke or Loehman-Whinston system may seem no less fair or simple to the individual participant that the voluntary system, although they may appear more "complex" to the experimenter. Scherr and Babb have made much of the response of participants in their experiment to this complexity in an attempt to explain the "anormalies" in their revealed preference behavior, but I would maintain that the most important explanation lies in their lack of understanding of incentives to strategic behavior.

[3] See Clarke, Ibid, 21-22 and J. M. Buchanan, *Demand and Supply of Public Goods.* Chicago: Rand McNally (1968), 43-46.

Figure 1 in the Scherr/Babb article, note, for example, that the assigned prices ($\bar{P}_1$, $\bar{P}_2$), which are equivalent to the cost weights under the Loehman-Whinston system, give each individual an incentive to misreveal his preferences unless the government has happened to have chosen tax-prices which are equal to own marginal benefits at the optimum output. For example, in the Figure 1 example, where the revealed benefits are assumed equal to true benefits and the demand revelation of the other participant is given, individual 1 would attempt to *overstate* his benefits in order to generate an output greater than the optimum output (q^*) so as to equate his own marginal benefit with his tax price ($RB_1 = \bar{p}_1$ at $\bar{q}_2$).[4] In turn, individual 2 would have *understated* his preferences so as to equate RB_2 with p_2 $\bar{q}_1$. Under other assumptions, more complex strategic behavior patterns are likely to arise. These would lead to an even more pronounced tendency to overstate (or understate) preferences to compensate for the behavior of others, in an attempt to obtain an optimum output for the individual participant which is different from the socially desired output.

The Clarke System. Under my system, the incentive to strategic behavior is lacking, including both that associated with systems (like Loehman and Whinston's) involving fixed tax-price assignments and that associated with conventional marginal benefit taxing schemes (e.g., the voluntary system used in the Scherr-Babb experiment). I have noted the incentive, arising from an excess of total contributions over supply cost, for participants to enter side arrangements designed to reduce or eliminate the excess. Further, I have indicated that this excess implies no departure from a socially optimum output, but does give rise to transactions costs which may be insignificant in any realistic setting.[5]

When comparing my system with that of Loehman and Whinston, it is important to note that the excess of contributions over cost under the former is precisely equal to the net welfare loss to society of non-optimum output determination under the latter. Where independent behavior assumptions are relaxed, however, and participants are assumed to misreveal demands in order to either compensate for or influence the revelation strategies of opponents, the result may be greater net welfare losses under the Loehman-Whinston system than the excess contributions under my system.

As I indicated in my article, this excess of contributions over cost requires attention to the nature of possible side arrangements, which could be considered in an experimental setting.

[4]The incentive for participants to in some cases overstate their preferences in the Loehman-Whinston system has apparently been ignored by Scherr and Babb as they associate strategic behavior with a consistent tendency to understate preferences in a way that has been associated with free-rider behavior when, for example, individual tax-prices vary as a function of one's own revealed demand. Thus, I was not surprised by their experimental results which indicated higher revealed demands under the Loehman-Whinston system as compared with my own. I was, however, surprised by results that showed higher revealed demands under the voluntary system.

[5]Clarke, ibid,. 30-31. This excess will result when assigned tax-prices are not equal to revealed demand prices at the actual output.

2. *Experimenting With Side Arrangements*

The Scherr/Babb experiment might be further modified by the introduction of such side arrangements. Without such arrangements, we deny participants the opportunity to make gains through negotiations of modified tax-prices under both my system and the Loehman-Whinston System.

The proposed further modification would necessitate substituting a real life opponent for the "stooge" in the actual experiment, and would permit negotiation of modified tax-prices or Loehman-Whinston cost weights. This permits us to observe the relative behavior patterns either in a convergence toward optimality through cooperative behavior or in a persistent tendency toward strategic behavior and reemergence of "free rider" phenonoma under the Loehman-Whinston type system.

Under my system, it would also provide a means of testing my hypothesis that the process by which participants arrive at a set of modified price assignments to reduce any excess of contributions over cost is independent of the process of output determination, implying that strategic behavior which arises in this process will not lead to a divergence from an optimum output solution.

3. *Information and Transactions Costs*

An experimental setting of the kind used by Scherr and Babb is ideal for exploring public choice behavior under various assumptions about information and transactions costs. In my system, I stressed the importance of zero *individual* information costs, which assumes that each participant in a public goods interaction has perfect knowledge of and can costlessly communicate his demand for a public good.[6]

With this assumption, we can then begin to ask what pricing system or alternative institutional arrangement will minimize all relevant costs—external (e.g., welfare losses from a non-optimum output of public goods) as well as information, transactions and administrative costs. I stressed that with zero individual information costs (and administrative costs equal under alternative arrangements, or zero in an opportunity sense), my system becomes, in effect, a zero cost arrangement for public goods choice. This contrasts with what are usually considered rather high external and decisionmaking (information and transactions) costs under alternative institutional arrangements and pricing systems.[7]

Perhaps the most interesting and useful experiments, however, would be those which come to grips with the problem presented by positive individual information costs. In my article, I noted that while there would be little or no reason, in any realistic setting, for individuals to devote resources to properly specifying their own preference functions there is also no a priori reason to believe

[6]Clarke, ibid, 31-32.

[7]Retaining the assumption of zero individual information costs is particularly important in the design of initial experiments comparing alternative institutional arrangements and pricing system. This underlies my proposed modification of the Scherr/Babb experiment, particularly perfect knowledge by the individual and experimenter of "true" preferences.

that individuals might not organize to economize on such information costs as efficiently as under any alternative system.

The desired point of departure for future theory and empirical testing should be the design of organizational arrangements which might generate a socially desired level of information and the comparison of behavior of individuals and groups under such market arrangements with conventional nonmarket approaches to collective decision-making such as voting. As I emphasized in my article, this is particularly important in public good interactions involving individuals and groups with highly differentiated tastes and preferences where the market-type arrangements might generate valuable information about such tastes and preferences, not otherwise obtainable under the non-market systems.