Gordon Tullock and the Demand-Revealing Process

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In 1970 Edward Clarke, then a graduate student at the University of Chicago, submitted a manuscript titled, "Introduction to Theory for Optimal Goods Pricing" to *Public Choice* which Gordon Tullock edited.[1] The manuscript claimed to have a solution to the problem of motivating people to report their preferences for public goods honestly. Tullock could not understand Clarke's argument, he later told me, but he decided that if Clarke was right the paper was important, so he would publish it. As editor of *Public Choice,* Tullock was free to make editorial decisions as he chose. The paper appeared Volume 11 (September 1971) of *Public Choice* under a title that had become "Multipart Pricing of Public Goods."

In September 1973 I arrived at the Center for Study of Public Choice for a one-year post-doctoral fellowship. When I told Tullock that I planned to spend the year reviewing ways of combining the reported preferences of individuals to make decisions, he responded that in that case I should include a discussion of the idea of Edward Clarke's that he had published.

This request distressed me, since I was aware of Clarke's idea, and I could not imagine that it would work. I was influenced by the 1954 paper in which Paul Samuelson had written:

> One could imagine every person in the community being indoctrinated to behave like a "parametric decentralized bureaucrat" who *reveals* his preferences by signalling in response to price parameters or Lagrangean multipliers, to questionnaires, or to other devices. But there is still this fundamental technical difference going to the heart of the whole problem of *social* economy: by departing from his indoctrinated rules, any one person can hope to snatch some selfish benefit in a way not possible under the self-policing competitive pricing of private goods; and the "external economies" or "jointness in demand" intrinsic to the very concept of collective goods and governmental activities makes it impossible for the grand ensemble of optimizing equations to have that special pattern of zeros which makes *laissez-faire* competition even *theoretically* possible as an analogue computer. (Samuelson 1954, p. 389)

[1] I infer the earlier title from footnote 1, page 129 in Mushkin (1972), which reads, in part, "two other works by Edward H. Clarke, 'Introduction to Theory for Optimum Public Goods Pricing.' *Public Choice*, IX (Fall 1971), and 'A Market Solution . . ."

With that quotation ringing in my head, I could not imagine that it was possible to motivate people to report their preferences for public goods truthfully. So it was with reluctance that I agreed to Tullock's request that I include an analysis of Clarke's idea in my review.

I knew about Clarke's idea because he had told me about it in spring 1968, when we were both graduate students at the University of Chicago. I had dismissed the idea out of hand. Then, in fall 1970, I submitted an idea to Selma Mushkin, for her book, *Public Prices for Public Products*. The chapter that followed mine was a second exposition of his idea by Clarke. It didn't make any sense to me. In spring 1971 Clarke and I appeared together in a seminar at the University of Chicago, organized by George Tolley, who supervised both of our dissertations. I had no comprehension of what Ed Clarke said at that seminar. So perhaps it is understandable that I put off dealing with Tullock's request that I analyze Clarke's idea.

By January of my postdoctoral year one member of the Economics Department had died in an automobile accident and another had retired for health reasons, so I agreed to a proposal that I would teach for the rest of the year and take my post-doctoral fellowship the following year. When I returned the following year to ways of aggregating reported preferences, I incorporated every idea on my agenda except Clarke's into a manuscript. That was where matters stood in March 1975, when I attended the Public Choice meetings in Chicago. There I encountered Martin Bailey, whom I knew because I had worked for him, as a consultant at the Treasury's Office of Tax Analysis, when Bailey headed that office. I told him that I was completing a review of ways of aggregating preferences to make decisions, but I still needed to deal with some idea by a fellow named Ed Clarke. His response was, "Well Clarke is right you know."

You could have knocked me over with a feather. Bailey's statement came from the fact that he had read Clarke's article in *Public Choice*, and Bailey was a very smart person. Now I was motivated to learn just what was going on with Clarke's idea. I returned to Blacksburg and studied Clarke's *Public Choice* paper intensely. Suddenly I understood it. I raced into Tullock's office and reported the news to him. He suggested an impromptu seminar. Five minutes into the seminar, Tullock was finishing my sentences. When I finished the presentation, he said, "No one will ever understand this idea the way Clarke wrote it. You and I need to write it in a way that people can understand."

For those of you who are not familiar with the idea, the essence of it is that it is possible to use marginal cost pricing to motivate people to report their preferences for public actions truthfully. After everyone's preferences have been reported, it is possible to calculate how much worse off, if at all, everyone else is, in dollars, as a consequence of the fact that one person reported the preferences that he did report instead of reporting indifference among all options. If the person knows that he will be charged this marginal cost, he will be motivated to report his preferences truthfully. And such calculations and charges can be made for all persons, motivating everyone to report preferences truthfully, so that the income-maximizing choice can be made.

The idea has four principle limitations: First, the money collected from people for the costs of accommodating their preferences has no natural allocation, and any disposition of it to participants threatens to disturb the system's incentives. But the amounts of money involved are generally quite small, and the right to receive it can be auctioned in advance to persons outside the group making the decision. Second, incentives for truthful responses are maintained only if people do not form coalitions. Tullock's proposed solution to this difficulty was that reports of preferences should be secret. Then coalitions will be undone by the incentives that people have, when they report their preferences, to ignore the commitments they have made to coalitions.

The third limitation is that the amounts of money that people are willing to pay to change outcomes depend on their incomes, and each person's real income depends on what would be chosen without his or her participation. This makes it generally not possible to give a set of participants consistent answers as to what would be done if each of them, separately, did not participate. If one asks them to report conditionally, depending on their incomes, then majority-rule cycles become possible and strategic opportunities are introduced. If one asks people to respond based on the subjective expected values of their incomes, then their responses cannot be said to represent their true valuations of possible choices, given their actual incomes. But income effects are generally small. The problem is akin to the fact that you cannot make an efficient decision about how much to spend on opera tickets today if you do not know what the price of tomatoes will be tomorrow. One can always muddle through somehow. If people report conditional preferences and cycles are encountered, then one cuts through them somewhat arbitrarily. If unconditional preferences are reported based on expected income, then there will be at least a little bit of unavoidable regret.

The fourth limitation is that the process does not yield a way of ensuring that decisions will be Pareto improvements. It evaluates only proposals that include fixed patterns for financing whatever is to be done. If we tried to allocate costs in proportion to revealed benefits, the incentive to reveal benefits truthfully would be lost.

Despite these limitations, it was a fascinating new idea. Tullock and I wrote it up under the title, "A New and Superior Process for Making Social Choices" and sent it to the *JPE*, where it was promptly accepted and published as the lead article in the December 1976 issue.

Meanwhile, Clarke had not persuaded his dissertation committee that his work constituted a dissertation, and George Stigler, to whom Tullock and I had submitted our paper for the *JPE*, was a member of Clarke's dissertation committee. So Tullock called Stigler and said, "You know, George, there is an outside chance that someday Clarke will get a Nobel Prize for this work. It would be embarrassing if you wouldn't give him a Ph.D. for it." Stigler response, according to Tullock, was, "OK. We'll look at it again." Not too long thereafter, Clarke received his Ph.D.

I should mention that George Tolley, who was the Chair of Clarke's committee, had a different understanding of events. As he saw it, they were simply waiting for Clarke to provide an adequate explanation of his idea, and they approved his dissertation when he had done this.

Tullock and I gave the name "the demand-revealing process" to Clarke's idea. But the idea was also developed independently by people who were unaware of Clarke's work and published after Clarke but before Tullock and me. As a consequence, the idea is known under several names. It is sometimes called "the pivotal mechanism" and sometimes the "Vickrey-Clarke-Groves" or "VCG" mechanism. In Google scholar searches I found "pivotal mechanism" 3,280 times, "VCG mechanism" 2,810 times, "demand-revealing"1,660 times, and "Clarke mechanism" 497 times. Under whatever name, it is a very widely discussed idea.

The central innovation of the idea is that if one disregards the usual requirement of a balanced budget, then it is possible to motivate honest responses through marginal-cost pricing of participation in decisions, thereby permitting efficient allocative decisions. The first stirring of this idea is credited to a 1960 paper by William Vickrey, but I am not aware of any evidence that Vickrey's work influenced the subsequent development of the idea, except with respect to auctions. Ed Clarke was first to apply marginal-cost pricing to participation in decisions about public goods. Theodore Groves was first to state the idea in its greatest generality.

Tullock became very interested in the demand-revealing process. He commissioned me to edit a special spring 1977 issue of *Public Choice* devoted to it. Tullock contributed three short articles to the special issue, titled "Practical Problems and Practical Solutions," "The Demand-Revealing Process as a Welfare Indicator," and "Demand-Revealing Process, Coalitions and Public Goods." The issue also had a comment by Tullock and me on a paper by Groves and Ledyard discussing limitations of the demand-revealing process.

In Tullock's subsequent work, the demand-revealing process was a frequently recurring theme. According to Google Scholar, the phrase "demand-revealing" occurs in 32 of his works.

Clarke's 1971 paper in *Public Choice*, according to Google Scholar, has more citations than any other paper ever published in *Public Choice*—2,824 as of September 19 of this year. Thus Tullock's decision that it was worth publishing a paper that he did not yet understand, was extremely fruitful.