Demand and Supply of Public Goods

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Maximal Economic Growth: A Geometric Approach to von Neumann's Growth Theory and the Turnpike Theorem. By JAROSLAV VANEK. Ithaca, New York: Cornell University Press. 1968. $5.75.

Maximal Economic Growth is offered as an attempt to "translate the theory of efficient growth—specifically, von Neumann's growth model with its turnpike extensions—into simple, nonmathematical language" so as to render the analysis "accessible to . . . nonmathematical economists and to students who have not . . . mastered advanced mathematical techniques."

The text begins with the presentation of the two sector production model and the subsequent characterization of intertemporally efficient growth paths. The analysis leads to the tendency for long run programs to approach and linger about one balanced growth, i.e., turnpike behavior about the von Neumann ray. Vanek then allows for various modifications of the basic model to consider the effects of technical change (Harrod neutral), factor reversals, more than two products, fixed coefficients, nonzero consumption, and joint production.

While the treatment is illuminating and does not require advanced mathematical techniques, it is far from elementary and readers will require substantial analytical competence to extract the completeness of Vanek's presentation. The exposition is generally heuristic in style and provides the reader more with an understanding of the theorems than with formal rigor.

Vanek begins each chapter with a brief indication of where the discussion is proceeding. These occasionally too brief introductions generally provide adequate motivation for the subsequent analysis. Still, occasionally when Vanek introduces a substantial modification into the model he does not, I feel, provide enough elaboration of the changes. For example, the chapter on "The Steady-Price Situation and the Maximal von Neumann Path" supposes a different initial condition for each growth path. While Vanek mentions this, it does mark a departure from the previous format and more than a passing mention might be helpful to the reader unfamiliar with von Neumann growth.

Maximal Economic Growth should, however, provide a worthwhile companion work to more formal treatments of growth theory and, alone, should serve to acquaint a wider audience with the nature of the von Neumann model.

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Demand and Supply of Public Goods. By JAMES M. BUCHANAN. Chicago: Rand McNally. 1968. 214 pp. $5.00.

I RECOMMEND this book to all serious students of public finance, especially those infused with the Samuelson-Musgrave approach to public goods. The book provides both an antidote to the methodological rationalization employed in that approach and a thorough indication of how the nonmethodological aspects of the approach have been developed during the past few years in relation to the seminal works of Duncan Black on democracy and Ragnar Frisch on Pareto regions. Most importantly, the book provides the kind of guidelines for future constructive work that Buchanan has provided over the past decade for his remarkably successful graduate students.

The specific contributions of this book are logically unrelated both to each other and to the book's title. The only substantial connection between these contributions is found in the peculiar terminology, which, together with some rather loose semantics, needlessly preclude a broad logical development of the subject. By constantly calling a cooperative game solution a "trading equilibrium"; by sometimes calling a statement of necessary marginal conditions for Pareto optimality a "theory of supply and demand"; by calling an economy with variable production an "exchange economy"; and by defining a "public good" as a good supplied by the public sector and then sometimes calling a good a public good before a public sector exists,

other times calling *all* goods public goods, and still other times calling public goods only those goods which have certain physical properties, Buchanan will fail to endear himself to the reader wishing to obtain a useful semantic framework from the book. Despite the obstreperous terminology, one can discern five unique and suggestive insights from the book. They are here briefly described and critically evaluated.

In the first and last of the book's ten chapters, Buchanan points out that positive (i.e., no value judgment) economics includes the describing of necessary conditions for Pareto optimality and of institutions which will satisfy these necessary conditions, and that the social welfare function, which Samuelson has led many to believe is *necessary* for economists to give generally valuable policy advice, can be replaced with the direct assumption that the government decision maker values advice from economists as to which institutions achieve Pareto optimality. The problem is that Buchanan, like Samuelson, gives no behavioral (i.e., nonmetaphysical) rationalization for his approach. Arrow's possibility theorem precludes a behavioral, nondictatorial, Bergson-Samuelson social welfare function. But Buchanan's approach *can* be rationalized by a simple behavioral model of the government decision maker's profit function and his resulting derived demand for information with respect to properties of alternative institutional structures. Assuming, realistically, that the economist has no better information with respect to the decision maker's profit maximizing actions regarding the distribution of utility than the decision maker himself, and ignoring the information costs of achieving different utility distributions via lump-sum redistributions, an economist's information as to which institutional structures will create a Pareto optimum has positive value even if the decision maker, in using the information, chooses to make some people worse off. For the decision maker would clearly be better off than originally if he used the information and actually paid lump-sum compensations to the losers. (Scitovsky paradoxes cannot exist when a policy change moves an economy to a Pareto optimum.) So the decision maker is willing to pay for the economist's information. Hence, *all* economics, including valuable policy discussions, can be rationally regarded as positive economics, if we, as Buchanan, restrict our policy comparisons to choices between Pareto nonoptima and Pareto optima.

Chapters II and III present a unique graphical description of two-person, noncooperative bargaining solutions in a world with a private good and a collective good for which use-exclusion does not exist. They also contain an unproved proposition that the cooperative solution is Pareto optimal. But Buchanan fails to note that the latter proposition requires the complete absence of information differences between the bargainers regarding each individual's decision function. Similarly ignored is the fact that the particular noncooperative solution that emerges depends upon the nature of the necessary information differences and corresponding information costs, which are never specified. In Chapters V–IX, where the world is generalized to n-person cases, the information structure remains partially, if not wholly, implicit. Several of these later models imply the *complete* absence of information differences and costs. In such a case, Pareto optimality is achieved regardless of institutional forms (so long as cooperative agreements are not prohibited). For example, total anarchy would generate a Pareto optimum in such a case because all individuals know that if they did not behave according to a certain Pareto optimum, a cooperative agreement would immediately arise (perhaps an agreement defining private property rights) in which they would end up by behaving in that way. Thus, Buchanan's assertion (Chapters VI and VII) that majority (or near-unanimity) rule will lead to Pareto optimal solutions if winning coalitions maximize their Pareto gain subject to the given utility of minority members, an assumption meaningful only under zero information differentials or costs concerning all individual choice functions, is trivial and completely begs the question of finding institutions that will generate Pareto optimality. Other parts of Buchanan's discussion imply that information differences or costs are positive, but in only *one* case are the implied differences or costs sufficient to generate a definite allocative model.

Some parts of Chapters VI and VII consider a well defined voting mechanism in which information differences concerning one another's choice functions are not assumed away.

Here, Buchanan heuristically shows that a *separate* election on each issue (i.e., "public good") would, with independent voting and utility functions for all issues single-peaked, imply the convergence of majority rule solutions to a region of Pareto optimality. Unfortunately, purely private goods (e.g., tax shares) would have to be considered in any realistic model. When this is done, one can always produce a voter's paradox,[1] so that, using the classic result of Black,[2] preferences must be multiple-peaked.

Buchanan does admit to complications in a case in which tax shares are included, but does not see the *impossibility* of obtaining single-peakedness and does not clearly state or show that this assumption is generally necessary for the Pareto optimality of his separate election process. The difficulty may be resolved by simply following Buchanan's Chapter IV in considering each person's tax share as a separate public good. But then, since one person's share necessarily affects the shares of others, it is obvious that *separate* voting on each issue is logically impossible. And it is trivial that Pareto nonoptimal voting solutions exist when there is both simultaneous issue consideration and information differences and costs concerning one another's decision functions. Despite many impressions Buchanan gives, he never does produce, nor is it possible to produce, a voting system which will generate, even asymptotically, pure Pareto optima once we allow private goods and certain information differences and costs regarding individual decision functions.

Chapter VIII argues cogently for the efficiency of a particular tax-expenditure principle. The principle is that tax shares should be determined separately from and prior to expenditure programs on the basis of something like an income tax graduated according to some sort of average of the income elasticities of the demand prices for the goods that might be produced by the government. If the computations are correct, people share the cost of the typical proposal in proportion to the prices that they are willing to pay for the extra commodity. Hence, if the expenditure could make everyone better off, it would receive one hundred per cent acceptance; and if it couldn't make everyone better off, it would receive one hundred per cent rejection. This tends to rationalize a voting (i.e., democratic) determination of expenditures given a constitutionally determined, properly graduated, income tax. The argument assumes that relative demand prices for a public good between individuals are known. Under such conditions, any administrator could specify the Pareto optimum, saving everyone his voting costs and making every decision, not just the typical decision, Pareto optimal. Furthermore, as Buchanan failed to note, redistributions through relative price changes induced by government decisions weigh heavily in many demand prices and thus votes for public goods, and these effects are substantially affected by factors independent of income.

Buchanan's Chapter IX is probably the most comprehensive discussion available on the physical characteristics of goods supplied by an efficient government. Yet the only definite conclusion which is not really original is that there is only an especially good argument for the government's supplying goods when the goods are Samuelson-type collective goods, because only for these goods is there a zero cost of the government's distributing a fixed output and a positive cost of the free market's distributing the same, fixed output through some "artificial" exclusion techniques (e.g., patents).

However, had Buchanan worked with an explicit information structure, he might have been able to see that the general argument for the government's supply and distribution of collective goods is not unique to these goods. That is, the efficient government will produce a good if and only if it can do so at lower transaction costs (including information costs and consumer surplus losses from inefficient output choices) than can private enterprise. For example, Buchanan would mistakenly rule out government fire protection or emergency medical care if there were no externalities between victims, whereas the efficient government may easily pro-

[1] Earl Thompson, "Discussion" (of Buchanan's paper), *American Economics Association Papers and Proceedings*, Vol. 58, No. 2 (May, 1968), pp. 337–340.

[2] Duncan Black, "On the Rationale of Group Decision Making," *Journal of Political Economy*, Vol. 56, No. 1 (February, 1948), pp. 23–24.

vide these services because it may do so at a lower transaction cost than would private fire stations and hospitals.

For the same reason, the lack of a specified information structure, Buchanan never does recognize the weaknesses of voting processes relative to their nonmarket alternatives,[3] which he does not mention. The most egregious of these weaknesses in voting processes in effecting an efficient composition of income, which stem from the facts that voting affects the distribution as well as the composition of income and fails to induce individuals to reveal the extents of their marginal evaluations for a government output, are (a) that when unanimity is not required, alternatives always exist which are less economically efficient than an optimum, but which benefit decisive proper subsets of the population; and (b) that an optimum may never be established, even temporarily, because the costs of arranging compensations sufficient to obtain decisive support for a change may be too high, which is especially likely when unanimity is required.

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Theory of Measurement. BY J. PFANZAGL, in cooperation with V. Baumann and H. Huber. New York: John Wiley & Sons. 1969. 235 pp. $11.50.

DEVELOPMENTS OF quantitative methods in behavioral sciences have presented problems of measurement that do not appear in classical fields such as geometry or mechanics. This book sets out to analyze the abstract nature of such measurements considered as procedures based on operations. It is concerned with the mathematical foundations of methodology rather than with techniques and deals with abstract concepts of measurement and the elaboration of formalism necessary for their general expression and investigation. While Pfanzagl's book looks especially towards psychometric applications, and most of the illustrations are of this type, it certainly has a wider interest. However, Pfanzagl does not touch measurement problems that arise in modern physics. For this, the author makes the valid excuse of ignorance. In the field of economics, general aspects of utility theory receive a valuable account, but those problems of measurement which arise peculiarly from concepts of economic theory are not treated. The reason no doubt is that they are unrepresentative of general forms of measurement. Nonetheless the book should be of real interest to anyone concerned with basic quantification problems.

Although it is claimed that the level of mathematics is moderate, nevertheless the book has the condensed style of a mathematical work. General mathematical material that is relevant is presented either in full, or partly by references where proofs can be found. The book is extremely well documented in the literature of the subject.

It is pointed out that almost every writer in the field has his own terminology, and that seemingly unrelated topics have a common basic model. Part of the purpose of this book is to establish a coherent uniform terminology.

Probably no other book has attempted to look at the subject so widely and so wholly. But Pfanzagl does not pretend to exhibit a final shape for measurement theory. Though the subject is at least as old as science, the author suggests that it is still too early for such a possibility. The intention is to present an integrated survey that will help consolidate the subject further as an abstract science, and stimulate interest in it as such.

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International Encyclopedia of the Social Sciences. EDITED BY DAVID L. SILLS. 17 volumes. New York: The Macmillan Company and the Free Press. 1968.

UNDER NORMAL circumstances the reviewer of a scientific work may regard himself as an object of exploitation. Books are not yet expensive enough to provide full compensation for

[3] Earl Thompson, "A Pareto Optimal Group Decision Process," *Papers on Non-Market Decision Making*, Vol. I (1966), Thomas Jefferson Center for Political Economy, University of Virginia.