

The Economist as Social Physician: Stigler's Thesis Revisited

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"My central thesis is that economists exert a minor and scarcely detectable influence on the societies in which they live. The thesis should of course be tested, and the historians of economics are the most qualified to undertake the tests." George J. Stigler, "Do Economists Matter?" *Southern Economics Journal*, January 1976

Introduction

George Stigler suggested four test cases of economists' influence on policy: repeal of the Corn Laws in 1846, adoption of full employment policies in the mid-twentieth century, progressive income taxes, and various public regulatory policies. Among the latter were environmental regulations. Stigler's hunch was that when the public becomes concerned about a problem, pollution for example, economists then discover that there are external diseconomies in the production process. He suggested that problems conceived outside the community of economists are subsequently dressed up by economists in the language of economic theory. As he put his conclusion a few years later in the Tanner Lectures on Human Values: "The main lesson I draw from our experience as preachers is that we are well received in the measure that we preach what the society wishes to hear" (1980, p. 159).

My expectation in planning this paper was to follow Stigler's suggestion by examining economics textbooks for the authors' theoretical explanations of what market failure is and their examples of market failure. The type of market failure I planned to consider was environmental externalities. The second step would be to investigate Stigler's hypothesis, by setting textbook treatment of environmental market failure against the background of popular scientific and political opinion, represented by newspaper editorials, political platforms, and legislative and regulatory initiatives. This would produce evidence bearing on the question of whether textbook authors lead or follow public opinion. This was to be an exercise in Stiglerian sociology of knowledge.

But then I read Maxime Desmarais-Tremblay's paper, "On the Definition of Public Goods: Assessing Richard A. Musgrave's Contribution" (2013). This led me to the origins of public goods theory, to an insight about my own way of thinking about market failure, and to a question. The insight was that the definition of a public good that I used in the classroom, presuming it to be the standard definition, was in fact Richard Musgrave's definition. But this was not the only definition of a public good. The question was, what was the contribution of the other "father" of public goods theory, Paul Samuelson? Once I began reading Samuelson I was captured, and I did not get back to what had been my plan. This paper is an analytical history of Paul Samuelson's theory of public goods. We look first at Samuelson's scholarly work on public goods theory, then at his *Economics* textbook. The motivation is the same as before, to test Stigler's theory about economists and public opinion. As we shall see, Samuelson's writings on public goods are consistent with Stigler's hypothesis that economists follow rather than lead. There are also implications from this history for the very idea of economists as social physicians.

Paul Samuelson on the Definition and Identification of Public Goods

Samuelson's Scholarly Work

Paul Samuelson and Richard Musgrave are generally credited with developing the modern theory of public goods. Musgrave gets credit for the common textbook definition of a public good as a good that is non-rival and non-excludable.¹ But Samuelson, the economic theorist *par excellence*, is credited with formalizing the concept in *The Foundations of Economic Analysis* (1983 [1947]) and in two papers on public expenditures (1954, 1955).² "The Pure Theory of Public Finance" (1954) is pure theory in motivation and detail. The article is a mere two and one-half pages long. "Diagrammatic Exposition of a Theory of Public Expenditure" (1955) is what the title indicates, with the aim of making the analysis in the previous article more widely accessible.

"The Pure Theory of Public Finance," 1954

The only context or motivation that Samuelson gives at the beginning of "The Pure Theory of Public Finance" is to say that "except for Sax, Wicksell, Lindahl, Musgrave, and Bowen,

¹ See Desmarais-Tremblay (2013).

² See Pickhardt (2006) for discussion of the origins and legacy of these two articles by Samuelson.

economists have rather neglected the theory of optimal public expenditure, spending most of their energy on the theory of taxation” (1954, p. 387). The literature he refers to is on what was known as the “voluntary exchange theory of public finance.” Samuelson’s analysis is of optimal public expenditure in the Pareto efficiency sense that no one can be made better off without making someone else worse off. He assumes two types of goods, private consumption goods and collective consumption goods. The former is rival – one person’s consumption is at the cost of another person’s consumption. The latter is non-rival – different individuals can consume the same unit of the good simultaneously. The argument is abstract and terse; Samuelson does not give an illustrative example of either type of good. The formal conditions for optimality are from *Foundations of Economic Analysis* (1983 [1947]), except for the introduction of goods that are non-rival.

Samuelson includes the ethical status of the distribution of goods in his analysis by positing an undefined social welfare function that reflects “ethical preferences” across all possible states of the system. This function is a necessary component of the model. But its determination “is not a ‘scientific’ task of the economist” except in requiring that if one person becomes better off without anyone else becoming worse off social welfare improves.³ Given conditions of production, individual welfare functions and the social welfare function, there is a “best state of the world,” i.e., Pareto efficient bundle of private consumption goods and collective consumption goods. Samuelson’s analytical innovation concerns the collective consumption good, for which individuals’ marginal rates of substitution are added vertically rather than horizontally. This analytical insight, Samuelson had learned, was not wholly new, for it had been developed in the literature on voluntary exchange theories of public finance. Thus his mention at the outset of the work of Sax, Wicksell, Lindahl, Musgrave, and Bowen. So his innovation is actually adding the ethical constraint to the problem. To establish the novelty and importance of the ethical component of the social welfare function, he writes:

³ The way he demarcates the role of the economist with regard to the social welfare function would seem to have several interesting implications for economic theory as well as ethics. “It is not a ‘scientific’ task of the economist to ‘deduce’ the form of this function; this can have as many forms as there are possible ethical views” (p. 387). First, there is separation of economics from ethics but its dependence on ethics. Second, the social welfare function is not derived from independent ethical truths, but from “ethical views,” which are many and perhaps diverse, even contradictory. Third, there is an implicit claim that economic theory has more restrictions than ethics with respect to its content. Otherwise no particular economic theory would have any particular truth claim.

The new element added here is the set (2), which constitutes a pure theory of government expenditure on collective consumption goods. By themselves (1) and (2) define the (s-1)-fold infinity of utility frontier points; only when a set of interpersonal normative conditions equivalent to (3) is supplied are we able to define an unambiguously “best” state. ...

but what I must emphasize is that there is a different such schedule for each individual at each of the (s-1)-fold infinity of different distributions of relative welfare along the utility frontier” (p. 388).

The policy implication he drew was that laissez-faire reliance on markets and voluntary exchange public finance both lead to sub-optimal outcomes by not getting the community to the ethically best point on the utility frontier.

Samuelson remarks that there is no “omniscient calculating machine” on which a planner can solve the maximization problem. He conceives of the market as an “analogue calculating machine.” If there are appropriate lump-sum taxes and subsidies, diminishing returns to variable factors and constant returns to scale in production, and convex indifference contours, if competition is maintained, and if all goods are private consumption goods, then with decentralized decisions about what to produce, the market will guide the community to the Paretian “attainable-bliss point.” This provides efficiency inclusive of equity. In this highly unlikely set of circumstances, the market will be an effective substitute for the non-existent “omniscient calculating machine.” But there is an additional requirement -- that the planner be able to calculate the appropriate tax and subsidy schedules in accord with the ethical constraint. In his model Samuelson has the taxes and subsidies set by the “servant” of the “ethical observer.”

The set of necessary conditions includes several margins on which the market might fail to attain the “attainable-bliss point.”⁴ But Samuelson’s focus is on the problems that arise from collective consumption goods. For these, individuals can hide their true valuations, hoping to free-ride on others. The free-rider problem bedevils equally the market and voluntary public finance. So through neither can the “computational problem” be solved in a decentralized manner.

Samuelson sums up the argument:

⁴ “the optimum of all the Pareto optima.”

The failure of market catallactics in no way denies the following truth: given sufficient knowledge the optimal decisions can always be found by scanning over all the attainable states of the world and selecting the one which according to the postulated ethical welfare function is best. The solution “exists”; the problem is how to “find” it (1954, p. 389).

How to find it? He suggests that one might “indoctrinate” each member of the community to behave like a “parametric decentralized bureaucrat,” i.e., to be honest about their valuations. But we cannot expect people to conform to the indoctrinated rules. So Samuelson leaves us with two “computational” methods that do not work, the market and voluntary-exchange public finance, and with no sense of what a workable alternative might be, if indeed there is one.

“Diagrammatic Exposition of a Theory of Public Expenditure,” 1955

A year later Samuelson published “Diagrammatic Exposition of a Theory of Public Expenditure.” He offered this diagrammatic presentation and the mathematical model on which it was based (1954) as an alternative to the Walrasian model of competitive general equilibrium, which can be formulated “so stringently as to leave no economic role for government” (1955, p. 350). His model, like the Walrasian model, was a polar case. But his was a polar case on the side of public expenditure. Referring to the 1954 piece, he wrote, “After providing the theory with its needed logically-complete optimal conditions, I went on to demonstrate the fatal inability of any decentralized market or voting mechanism to attain or compute this optimum” (1955, p. 350).

In his 1954 article Samuelson had not identified any real-world or hypothetical non-rival goods. In this one he identifies a hypothetical private consumption good -- bread -- and two public consumption goods (a change of name from collective consumption good) – an outdoor circus or national defense. This likely was a response to two critics. Stephen Enke (1955) used Samuelson’s 1954 piece to illustrate what he considered the sterility of pure theory – mathematics with symbols but no quantities. “This spinning of theories, with little reference to the real world, can retard progress within economics and bring the profession into disrepute among those who must apply economic theories to problem areas” (p. 131). Enke’s challenge was on the very point that was Samuelson’s motivation for writing the 1954 article, the value of mathematics for economics.

One aspect of Samuelson's article in particular that Enke found deficient was that it dealt with polar cases only; all goods in the model are either private consumption goods or collective consumption goods. Most goods and services that governments actually provide do not fit Samuelson's definition of collective consumption goods.

Now a great many government-provided goods, perhaps most, do not fit this definition, if consumption means enjoyment. Examples are highways, public hospitals and libraries, police and fire protection, and defense against air attack; in each case, for a given public expenditure, I can have better service or more consumption enjoyment if other people will not exercise their rights to those benefits or compete with me for their favorable deployment. Samuelson's collective consumption goods comprise a small class at the opposite extreme from his more numerous private consumption goods (p. 132).

Enke challenged Samuelson to show that his theory could handle the intermediate cases of non-pure private and collective consumption goods. He also raised the question of whether the model could distinguish between the roles of different levels of government -- national, state, and local. His closing comment, intended for theorists by way of Samuelson, was that economists have a moral responsibility to provide policy advice rather than indulging in the selfish pleasure of "elegant manipulation of highly abstract models" (p. 133).

Samuelson conceded that "the careful empiricist will recognize that many -- though not all -- of the realistic cases of government activity can be fruitfully analyzed as some kind of a blend of these two extreme polar cases" (1955, p. 350).

The focus of Julius Margolis's criticism (1955) was Samuelson's separation of the economic problem from the social welfare function. Margolis thought that by assuming that the "ethical observer" finds the optimal tax and transfer scheme before the economists' work is begun, Samuelson had assumed away the crux of the problem of public expenditures. There are not, according to Margolis, separable "socio-political" and "technical" sectors such that the economist can deal only with the latter. He attributed the separation of the two in Samuelson's model to Samuelson's being an economic liberal, who considers a private market economy natural, and public expenditures departures from the natural. For such a liberal, any move away from the

natural market to collective production becomes necessary only by virtue of the technical characteristics inherent in certain goods.

Margolis also made the same point as Enke, that Samuelson's normative model was inadequate as a positive model, for many goods provided by government are not collective consumption goods. Many goods provided by government are divisible and serve private ends. He gave as examples education, hospitals, highways, and even police and judicial services. In some instances government mandates consumption of the good, such as education; in others consumption is optional but free; and in others there is a charge for the good. An adequate positive theory of public expenditure would need to penetrate "the murky waters of political sociology" (p. 348). Here one would find that "existential values" rather than the technical qualities of goods lie behind public expenditure decisions. To see what this would involve, Margolis recommended the work of Edward Banfield, Talcott Parsons, and Edward Shils.

Samuelson's response to Enke's call for policy implications was that there was indeed a policy implication in his analysis. This was that "Wicksell (was right) to worry about the inherent political difficulty of ever getting men to reveal their tastes so as to attain a definable optimum" (1955, p. 355). This is a negative policy conclusion about what will not work. But Samuelson did not tell readers what would work.

He expressed his desire to "clear myself from Dr. Margolis' understandable suspicion that I am the type of liberal who would insist that all redistributions take place through tax policies and transfer expenditures: much expenditure on education, hospitals, and so on, can be justified by the feasibility consideration that, even if these are not 100 per cent efficient in avoiding avoidable dead-weight loss, they may be better than the attainable imperfect tax alternatives." (1955, p. 356).

In distancing himself from a particular kind of economic liberalism, Samuelson also moved away from where he began, from a normative model of public expenditure to what appears to be a mixture of positive and normative conclusions arrived at from outside the model. He suggested that people vote for paternalistic policies such as education (presumably public education coupled with the requirement that children be sent to school) because they (the people) "do not consider the results from spontaneous market action as optimal" (1955, p. 356). Governments provide services in sectors subject to increasing returns, and others in "myriad 'generalized

external economy and diseconomy' situations, where private pecuniary interest can be expected to deviate from social interests" (1955, p. 356).

As to what Samuelson regarded as the most serious criticism of his analysis, that most functions of government do not fit his definition of public good (i.e., collective consumption good) he responded that he agreed fully, which is why he described his model as a polar case.

However, to say that a thing is not located at the South Pole does not logically place it at the North Pole. To deny that most public functions fit into my extreme definition of a public good is not to grant that they satisfy the logically equally-extreme category of a private good. ...

Indeed, I am rash enough to think that in almost every one of the *legitimate* functions of government that critics put forward there is to be found a blending of the extreme antipodal models. One might even venture the tentative suspicion that any function of government not possessing any trace of the defined public good (and no one of the related earlier described characteristics) ought to be carefully scrutinized to see whether it is truly a legitimate function of government (1955, p. 356, emphasis added).

In responding to Margolis's critique Samuelson thus broadened his normative "model" to include in-kind transfers, democratically sanctioned paternalistic policies, myriad generalized external economies and diseconomies, and instances of increasing returns. He suggested that future research will show increasing returns and monopolistic competition to be important causes of market failure. Having the difference between the implications of his model of optimal public expenditure and what governments actually spent money on pointed out, Samuelson backed away from his model. He also began to have reservations about the potential of economic theory to contribute to the discussion.

Economic theory should add what it can to our understanding of governmental activity. I join with critics in hoping that its pretentious claims will not discourage other economic approaches, other contributions from neighboring disciplines, and concrete empirical investigations (1955, p. 356).

"Social Indifference Curves," 1956

Samuelson's 1956 paper on "Social Indifference Curves" provides the next development of his analysis of public expenditure. This paper was ostensibly about whether community indifference curves are possible, a question that he had earlier answered in the negative. He returns to the question here in response to Tibor Scitovsky's work on tariff theory that relied on the curves Samuelson thought he had proved to be impossible. Samuelson reconciles the impossibility of Scitovsky community indifference curves with their usefulness in demand theory by deriving what he calls "social welfare contours."

For our purposes the differences between the two are unimportant. What is important is what Samuelson writes about social groups. He begins with the family and home economics, where there are important consumption externalities. Members of a family have interdependent utility functions based on altruism. Yet economists treat the family as if it was a single individual consumer. Samuelson reasons that if the family can be treated as if it is a single individual, so too can larger social groups in which there are altruistic consumption externalities. "Such problems of home economics are, abstractly conceived, exactly of the same logical character as the general problem of government and social welfare" (1956, p. 10). Just as transfers are necessary within the family to achieve the ethical optimum, where the marginal social ordinal utility of dollar expenditures or consumption is equal across members of the family, so too are transfers required for larger social groups. The policy insight in this analysis is that for either a family or a nation the transfers must be made just before the final equilibrium is reached, or made with foreknowledge of what the equilibrium will be. This requirement is, by Samuelson's acknowledgment, utopian.

Then he comes to the matter "Perfect Competition and Bliss." He asks if, assuming that the utopian transfers are made, "perfect competition can be counted on to lead to *the optimum*?" (1956, p. 19, emphasis in original). Abraham Wald (1951) proved the uniqueness of the perfectly competitive equilibrium. But Samuelson proves that this unique equilibrium

is subject to the possibility that the resulting equilibrium point is one of multiple supply-demand intersections generated by the contrived initial reallocation point. Only one of these multiple points is ethically optimal, but that one could be an unstable intersection point. If so, the market mechanism will not be a good administrative device for reaching the ethical optimum – unless the difficulty is diagnosed and rectified by selection of some other proper initial endowment point (p. 22).

Samuelson is finding ever-mounting reasons to believe that competitive markets fail and that there are insuperable barriers to finding and arriving at the social optimum. Curiously however, he concludes the article with the judgment that “the foundation is laid for the ‘economics of a good society’” (p. 22).

“Aspects of Public Expenditure Theories,”1958

In a paper written for the 1955 meeting of the Econometric Society and American Economic Association, Samuelson presented his vision of the nature of government and public finance by way of imagined history based on his “a priori conceptions of the moment:”

Once upon a time men on this [imagined] planet were all alike and very scarce. Each family hunted and fished its symmetrical acres; and each ended with the same production and real income.

Then men turned to cultivating the soil and domesticating animals. This left even more of the globe vacant, but did not disturb the symmetry of family incomes.

But finally population grew so big that the best free land was all occupied. Now there was a struggle for elbow room. According to the scenario as I choose to write it, the struggle was a gentlemanly one. But men did have to face the fact that recognizing the squatter’s rights and respecting *laissez-faire* did result in differences of real incomes among families.

Optimal transfer expenditure. Here then for the first time, government was introduced on this planet. A comprehensive program of redistributing income so as to achieve a maximum of the community’s social welfare function was introduced. The budget was balanced at a non-zero level: taxes were raised in a non-distorting lump-sum fashion, and transfer expenditure was allocated among families so as to achieve the marginal conditions necessary to maximize the defined social welfare function. ...

Now why do I describe so bizarre a model? It is to underline this theoretical point: Given a social welfare function, and given the absence of all technological and taste externalities, and given universal constant returns to

scale, there would be needed only one type of public policy – redistributive transfers (1958a, pp. 332-33).

There is much that could be said about this fable. But for now we will note simply that the passage shows that for Samuelson the “economic” problem of efficiency as commonly understood was secondary to an ethical standard of equality of marginal utility of income.

Samuelson’s analytical conclusions were not favorable for the prospects of either market allocation of goods and services or public allocation with benefit-based finance. But, “the world’s work does somehow get done. And to say that the market mechanisms are non-optimal, and that there are difficulties with most political decision processes, does not imply that we can never find new mechanisms of a better sort” (1958, p. 334). He suggested two possible ways to the “bliss point,” both of which depended on homogeneity within social groups that would enhance the prospects for people being honest. But he did not develop this idea, instead ending the paper on a gloomy note.

Once again in contemplating the dilemmas that most forms of political voting involve, we are reminded of the beautiful and special simplicities of the *laissez-faire* model. But, alas, the difficulties are those of the real world. And it would be quite illogical to conclude from all this that men and technology should be different, should be such as to make the competitive game all-sufficient. That would be as silly as to say that we should all love sawdust because its production is so beautiful (1958a, p. 336).

He suggested that economists’ work was not complete, and that the next frontier was “exploration of those momentous coalitions of decision-making that are part of the essence of the political process” (1958a, p. 336). This would seem to suggest that the next step in analysis was to be public choice analysis.

“Public Goods and Subscription TV: Correction of the Record,” 1964

Actually, the next step for Samuelson was a curt response to Jora Minasian, who cited his 1954 and 1958 papers in an evaluation of public goods theory in the context of pricing of television broadcasts. Samuelson (1958a) used television as an example of a mixed good. The marginal cost of adding an additional viewer is zero, i.e., television broadcasts were non-rival; yet scrambler technology allowed potential viewers to be

prevented from viewing, i.e., television was excludable. In the 1958 piece Samuelson had implicitly added Musgrave's second characteristic of a public good, non-excludability, for scramble technology has no connection with non-rivalness.

At the time the Federal Communications Commission was considering whether to allow subscription television programming. Samuelson asked whether scrambler technology turned a public good into a pure private good. His answer was "no," for the marginal cost of adding viewers was zero. Efficient pricing at $P=MC$ requires that television be free. This condition of increasing returns to scale puts television in the category of a mixed good, neither a pure public good (despite increasing returns) nor a pure private good (despite excludability).

He suggested that some degree of increasing returns was common to many goods, for example, railroads, water supply, electricity, and post offices, so that user-benefit pricing would be problematic. This posed practical and theoretical problems:

It is not enough in the decreasing cost case to come closer to marginal cost pricing in the Lerner-Lange manner, making up the deficits by general taxation. As soon as decreasing cost and diversity of product appear, we have the difficult non-local "total conditions" to determine what finite mix of product is optimal. This involves a terrible social computation problem: we must scan the almost infinite number of possible products and select the best configuration; we cannot feel our way to the optimum but must make judgment at a distance to determine the *optimum optimorum* (1958a, p. 336).

Minasian argued that the technical characteristics of a good or its production could not be used to determine the optimal allocation system for the good. Minasian's argument turned on the difference between allocation of broadcasts once it has been determined how many and which programs will be broadcast, and allocation of resources to programming. He placed the latter problem ahead of the former, and suggested that even if the marginal cost of adding viewers to a given program is nil, pricing the program allows for generation of information on the value of different programs.

A pure theory of public expenditure purporting to identify on economic grounds the goods that are best provided by collective action should have the power to

govern choice among alternative institutional arrangements on the basis of their relative merits. The present theory of public goods is incapable of generating the relevant economic information. It consistently rejects a particular system not on the basis of its merit relative to other alternative approaches to a particular problem, but merely because it does not fulfill the conditions of an “ideal” world. Consequently, it cannot be expected to provide and, as the following examples suggest, it does not provide a correct identification of the economic problem (1964, pp. 78-9).

Samuelson replied that his remarks on public goods and subscription television had “been scandalously misinterpreted” (1964, p. 81). “The reader of this paper [Minasian’s] could be pardoned for thinking that I have opposed subscription television. Upon reading my paper, he will be surprised to learn that I expressed no opinion on the merits of commercial television versus subscription television” (1964, p. 81). Minasian did misinterpret Samuelson, although it is unlikely that he did so for the reason suggested by Samuelson: “Only a bigoted devotee of *laissez faire* will find the theory of public goods, properly understood, subversive” (1964, p. 83).

There are three statements in Minasian’s article that misinterpret Samuelson. They are (1) “In a more recent contribution, Professor Samuelson refers to television broadcasting as a pure public good” (1964, p. 71); (2) “Professor Samuelson appears to be opposed to subscription television because it would raise price above marginal cost (which is zero)” (1964, p. 74); and (3) “Professor Samuelson seemed to reject the use of descramblers” (1964, p. 77).

Minasian may have blundered into the first misinterpretation by conflating Samuelson (1954) and (1958). In (1954) there is an unnamed “private consumption good” and an unnamed “common consumption good,” the latter having the quality that “each individual’s consumption of such a good leads to no subtraction from any other individual’s consumption of that good” (1954, p. 387). But in (1958a) he identifies television not as a *pure public good*, but as a mixed good. So Minasian was wrong about Samuelson’s identification of television with regard to public goods and private goods. But he was right in the sense that television fit the definition of a pure collective consumption good as Samuelson defined it in (1954).

Minasian’s statements (2) and (3) say that Samuelson *appeared* to oppose subscription television and the use of scramblers, which amount to the same thing. This is not a wholly

unreasonable interpretation of Samuelson for the very reason that Samuelson would seem in his analysis to be leading up to a statement about the proper allocation and pricing of television and other goods that have some degree of public goodness. But he stops short of doing so. In fact he and Minesian actually agree that, in Minesian's words, "the *theory* of public goods is of little help in distinguishing those goods that are best provided via community action from those that should be left to individual decisions and preferences" (1964, p. 78).

"Pitfalls in the Analysis of Public Goods," 1967

James Buchanan (1967) attempted to mediate the dispute between Samuelson and Minasian. He thought they both muddied the water by comingling theory, made-up examples to illustrate theory, and real-world policy questions. Buchanan's interest was in development of theory, which he apparently did not think was sufficiently well developed for application to policy. In order to clarify the theoretical issues, Buchanan built a model of television transmission on an island. Stressing that the model was artificial, Buchanan began with a signal that comes from afar to a single antenna on the island. He made simple assumptions about cost and considered different ways of allocating the signal to island residents. Buchanan drew the conclusion that free distribution with tax-price financing and a perfectly price discriminating monopolist could both be Pareto optimal. He likened the public goods problem to Marshall's theory of joint supply of products.

Buchanan agreed with Samuelson that no set of theoretical tools was fully adequate for evaluating real world policy questions. But he suggested that Samuelson had succumbed to the temptation of which he accused Minasian, allowing his ideological preferences to guide his argument.

It is equally unfortunate that Samuelson chose to keep the discussion on the same ground [subscription television]. Finally, it is distressing that Samuelson, who could have had the better of the argument, threw his own advantage away by bringing ideological overtones into what should be a reasoned debate. In so doing, he placed an ideological cloud over the whole theory of public goods, to which he has contributed so much (p. 197).

Samuelson's main reaction to Buchanan was that his model was unrealistic. This is not unlike Stephen Enke's criticism Samuelson's "The Pure Theory of Public Finance."

Buchanan starts out by playing God, examining the results of “an ideally-operating tax-financed, collective facility” ...

This result satisfies my equations of Pareto-optimality ... How did God get there? Buchanan does not tell us (1967a, p. 200).

Likewise for Buchanan’s “God-like” perfectly price discriminating monopolist.

Although that fellow gets referred to in textbooks, he does not exist on land or sea and never will. He is just another name for God. How does he “find out” each man’s marginal-utility function? Only by playing a zero-sum game with him. Each man has every incentive not to reveal to his Opponent his marginal utility. Only by fiat of the textbook writer, does the Opponent always win the game’s maximum stakes. For him to look into the hearts of 200 million, or 20 thousand, or 2 consumers, and guess right requires miracles (1967a, p. 201).

There are two points to notice about this criticism. The first is that Samuelson’s objection seems to be to the idealizations of “pure theory.” How his remarks bear on his own analysis he does not say.

The other point about this criticism is that it highlights Samuelson’s core conclusion regarding the public goods problem, that he sees no way in the real world to overcome free-riding. If there is no brake that can be applied to free riding, then neither markets nor public allocation with benefit-based taxation will attain social Pareto optimality. And if people are able to free-ride on the tax and subsidy, ability-to-pay financing is unworkable as well.

Samuelson’s emphasis on the game theoretic nature of the problem is brought out as well in his disagreement with Buchanan on the relevance of the theory of joint supply to the public goods problem. Wool and mutton equilibrium, to use Marshall’s example of joint supply, has no game theoretic aspect. But with public goods, “as the number of men grows, the problem becomes *more* game-theoretically indeterminate” (1967a, p. 202, footnote 5).⁵

“Indeterminacy of Governmental Role in Public-Good Theory” 1967

⁵ This would seem to imply that the quantitative difference between a family and a nation becomes a qualitative difference as one moves from the small group that is the family to the large group that is the nation.

In the same year Samuelson responded to a piece by Francesco Forte (1967). Forte argued that economists following Samuelson's lead had oversimplified the conditions bearing on decisions about public expenditures. There were considerations other than excludability and jointness of supply (rivalness) with bearing on the matter of how government should be involved in provision of goods. In some cases these factors would suggest direct public production of the good, and in others public subsidies to private firms. For example, there might be an advantage in providing national defense directly through government rather than by private firms with public subsidies, because mercenaries would have less loyalty to the nation, and because only the government would be large enough to take advantage of the available economies of scale. On the other hand, private but publicly subsidized police may be viable. So Forte concluded that Samuelson had not provided a theory of public expenditure, but only a theory of public subsidy. Depending on the circumstances, the subsidy might be to a private firm or to a unit of government.

Samuelson (1967b) wrote briefly in reply to Forte that his 1954 and 1955 articles did not imply that private goods should be produced by private enterprises and public goods by government. 'Where the consumption externalities intrinsic to a non-private good occur, all that I would insist on is that laissez-faire cannot be counted on to lead to an optimum' (1967b, p. 47). His analysis had no bearing on the question of what institutional arrangements would approximate optimality by overcoming the game theoretic problems of free-riding.

"Pure Theory of Public Expenditure and Taxation" 1969

Having joined in 1954 a discussion of public expenditure that had a long and rich history of which he was mostly unaware, having used mathematics in which many public finance economists were not proficient, and having provoked criticism that his theory could not account for the bulk of public expenditures, Samuelson sought in a 1969 paper to set the record on his theory of public expenditure and taxation straight. He wrote this paper for a conference on the public economy and its relation to the private sector. Samuelson thought many of his critics simply did not understand his theory. So he set out to present his theory in both mathematics and prose, and to situate it in the context of historical and modern literature on public expenditure and taxation. The analysis was to be primarily normative, but with some attention to actual institutions in relation to the optima.

He began with an ideological classification of economists who had contributed to the literature on taxation. “Conservative” writers favored benefit theories with allocation of the tax burden arising from public expenditures based on benefits received. This form of taxation would mimic the market, where one pays for what one receives. “Radical” writers favored ability-to-pay theories of taxation, with the tax burden designed to be redistributive. Dismissing the notion of a social compact of the sort that might give people rights to their property, Samuelson favored the utilitarian idea of a social welfare function which “tends to subvert the older notions of ‘legitimacy’ – that things are done as they are because they have always been so done; that people have a contractual right to no changes” (1969, p. 100). He thought the change from a notion of cardinal utility to ordinal utility in the social welfare function resolved the problem of the “crude and materialistic calculus of hedonism” in the older utilitarian formulations. It is not entirely clear what he considered crude -- the calculus of hedonism, or hedonism.

The two different theories of taxation reflected different ideas of justice:

On the one hand, a just or equitable society is one in which incomes are properly allocated to produce the greatest bliss for the whole universe – even if that means sacrificing something of one man’s well-being in a good cause of adding more to the rest of mankind’s well-being. Against this is the notion that each man, by virtue of being a man, has an inviolable core of rights that cannot be infringed even to secure some net increment to the social good, or at least cannot be infringed in his case unless all others (who are somehow comparable!) are being similarly treated (1969, pp. 100-01).

In a footnote Samuelson suggested that this second theory of justice would become more important for libertarians the further the actual economy moves away from Victorian capitalism, “putting the burden of proof upon any departure from their defined condition of inviolable natural rights and individual liberties (inclusive of property rights) (1969, p. 101, n. 2).

Samuelson reiterated two themes of his earlier papers. The first was that voluntary tax payments according to benefits received is not feasible. The second was that for optimality, allocation of benefits from public expenditures and of redistribution via ability-to-pay taxation must be solved simultaneously. He also clarified that in his model a public good might enter one person’s indifference function positively, another person’s negatively, and another person’s not at all.

There is no requirement that the benefits from a public good be the same for all. All that is required is that the consumption externality be non-zero for at least one person. “A public good – call it x or x_2 or x_{n+m} – is simply one with the property of involving a ‘consumption externality’, in the sense of entering into two or more persons’ preference functions simultaneously” (1969, p. 102).

Then he presented the mathematics of his “pseudo-demand” analysis, which is the demand that would be used by an “omniscient planner” with knowledge of every individual’s indifference function. He did not deal with the matter of what kind of exclusion devices might actually be used by the omniscient planner to reveal indifference functions regarding goods with consumption externalities, “since this is all merely a computing algorithm, which an electronic computer could use, dispensing with the dramatic device of a referee and market terminology” (1969, p. 103).

At this point in his contribution to the literature on public goods, Richard Musgrave’s *Principles of Public Finance* (1958) contained the analysis that Samuelson was most concerned to compare and contrast with his own.⁶ The points of comparison with Musgrave were technical matters having to do with the general equilibrium system and its component social production-possibility frontier, individual preference functions for public and private goods, and Bergsonian social welfare functions.⁷ But he was also concerned to convey in no uncertain terms his belief that his analysis, which he thought others were “groping toward,” revealed that the search for an attainable social Pareto optimal allocation was at a dead end. As he put it in the heading for section 4 of the paper, the analysis was an “affirmation of doubts.”

It is striking how Wicksell and Lindahl, and even Musgrave and Johansen (and now Dorfman’s name can perhaps be added), after getting a glimpse of the pseudo-equilibrium descend to the swampland of mathematical politics, ending up with inconclusive behavior patterns by legislatures, factions and parties, running inevitably afoul of Arrow’s Impossibility Theorem. Game theory, except in trivial cases, propounds paradoxes rather than solves problems (1969, p. 106).

⁶ He pointed to Leif Johansen’s *Public Economics* (1965) as the analysis that indicated the author’s fullest understanding of his own and as that which was closest to his in content.

⁷ Abram Bergson (1938).

Despite the best attempts to find a voting mechanism that would lead to Pareto-optimality, there was no way around the Prisoner's Dilemma inherent in the distributional consequences of politics. Samuelson affirmed that "Pareto-optimality is a definition not an inevitable destination" (1969, p. 107).

Although Samuelson's first paper on the public expenditure problem (1954) was conceived as a demonstration of the usefulness of mathematics in economics, he must have thought that he had stepped into a "swampland" of English prose. For much of the discussion after 1954 concerned what in "the pure theory of public expenditure," X_{n+1}, \dots, X_{n+m} "collective consumption goods" actually were. Samuelson expressed regret that his analysis was in terms of polar cases of pure collective consumption and private consumption goods, for it had become clear that no actual goods were at either pole. He had tried to resolve this problem of relating the pure theory to the world of actual goods and actual public expenditures by suggesting that actual goods fell between the two poles as a mixture of the two types. But this resolution seemed not to lend itself to analysis, so in 1969 he sought to clarify the definition of a public good in such a way that there would be a better fit between theory and reality. This is, as we have seen, that a public good enters two or more people's utility function. The definition does not require that it enter everyone's utility. Therefore virtually every good is a public good. The private good pole has become a "knife edge," with everything that does not balance on the edge falling into the public good category. For application, one would use the model of a pure private good (such as one uses the model of perfect competition) and judge whether real world goods are close approximations. The implication Samuelson drew is rather ominous:

This does, however, lead to an uncomfortable situation. If experts remain nihilistic about algorithms to allocate public goods, and if all but a knife-edge of reality falls in that domain, nihilism about most of economics, rather than merely public finance, seems to be implied (1969, p. 109).

He made a few suggestions of possible ways to avoid his "nihilist" conclusion, but without evidence of much hope for their prospects.

Economics: An Introductory Analysis

With Samuelson's first article on public goods being published in 1954, it is not surprising that the concept does not appear in the first edition (1948) or the second (1951) of his textbook. Neither

edition has index entries for “collective consumption good” or “public consumption good,” the terms he used in the 1954 and 1955 journal articles. Nor does the 1955 third edition. The first three editions also do not have index entries for “market failure.”

The third edition has three index entries for “external economies and diseconomies.” All three are to footnotes. The first of the footnotes is in a discussion of long-run adjustment in the chapter on “Demand and Supply.” The note is a reference to Marshall’s discussion of external economies due to reductions in factor prices or increases in productivity that result from an industry’s expansion. The second footnote, in the chapter on applications of supply and demand, provides an expansion of the same discussion.

The third footnote is in an appendix to the chapter on “Profits and Incentives.” The appendix concerns general equilibrium and welfare economics under the heading, “Review of Commodity and Factor Pricing: General Equilibrium and Parable of Ideal Welfare Pricing.”

The footnote reference to external economies and diseconomies is in a brief subsection on “Welfare Economics in a Free Enterprise Economy.” Here Samuelson lists criticisms of the US economy by “friendly and unfriendly” critics “from various ethical viewpoints.” The first is that “the existing distribution of property, income, education, and economic opportunity is the result of past history and does not necessarily represent a perfect optimum according to the ethical philosophies of Christianity, Buddhism, paganism, the American creed, or other ideologies” (*Economics*, 1953, p. 608). The second criticism is the prevalence of monopoly in the American economy and “the limited appearance of perfect competition” (*Economics*, 1953, p. 609). The third object of criticism is the waste from unemployment and the business cycle.

The footnote adds a fourth criticism, “that individual firms, in making their decisions, never take into account the possible effects of their production decisions on other firms or industries” (Econ, 1953, p. 609, n. 1). This creates external diseconomies and economies, as when the person or firm digging an oil well does not take account of the fact that they extract oil from a common pool. Samuelson gives A.C. Pigou’s *Economics of Welfare* as a reference. He also says that with perfect competition there is insufficient incentive for invention because the would-be inventor knows that he could not fully capture the return from his innovation.

So the third edition of *Economics: An Introductory Analysis* made scant use of welfare theory, with references to external economies and diseconomies only in three footnotes. The two

chapters of the third edition on the economic role of government -- "Expenditure, Regulation, and Finance" and "Federal Taxation and Local Finance" (chapters six and seven) -- are descriptive rather than analytical. This pattern of welfare theory being confined to a discussion of pricing in an ideal socialist economy and the chapters most directly concerned with the functions of government giving description of government activities and finances with a minimum of analysis was set in the first edition and carried through the third.

The fourth edition (1958b) is little different from the third. There are the same two chapters on the role of government in expenditures, regulation, and taxation that are predominantly descriptive. This edition has two index entries for "external economies and diseconomies." One is repeated from the third edition and has to do with declining cost industries. The second is in a new discussion of the economics of technology and concerns external economies in scientific knowledge from the development of nuclear power.

The fourth edition has three index entries for "collective consumption," all in chapter 6, "The Economic Role of Government: Expenditure, Regulation, and Finance." The context for all three is descriptive rather than analytical. The first identifies collective consumption as a category of government activity.

Collective Consumption. As we have also seen, the increase in government expenditure means that as a nation we are consuming more of our national product *collectively* rather than individually through private money purchases. Rather than pay to ride on the public roads as we do to ride on the railroads, we pay for such valuable services by taxes.

But note that such collectively consumed goods and services are still *largely produced by private free enterprise*. The government may pay for a hospital or a typewriter, but each of these items is produced by free private enterprise. And so it is with most government expenditure on productive goods. This is hardly what the socialists mean by socialism -- 'government ownership and operation of factories, etc.' (1858, p. 118).

The second use of the term is in making the distinction between government expenditures and transfer payments. The third is in the context of explaining how taxes redirect resources from

“the community’s private consumption activities and shifting them to its collective governmental activities” (1958b, p. 122).

An additional use of the term that is not indexed is in chapter three, “Functioning of a ‘Mixed’ Capitalistic Enterprise System.” In a section under the heading “The Economic Role of Government” Samuelson writes:

More than this, government provides certain indispensable *collective* services without which community life would not be thinkable, and which by their nature cannot appropriately be left to private enterprises. Government came into existence once people realized, “Everybody’s business is nobody’s business.” Obvious examples are the maintenance of national defense, of internal law and order, and the administration of justice (1958b, p. 44, emphasis in original).

A footnote gives the “famous example” of lighthouses and, quoting an unidentified advanced text “a divergence between *private* advantage and money cost (as seen by a man crazy enough to try to make his fortune running a lighthouse business) and true *social* advantage and cost. Naturally, a beginning text will only mention such issues” (1958b, p. 44, n. 1).

Conclusion

The overall conclusion that we might draw from this review of Samuelson’s writings on public goods is that there are unresolved questions at the level of the nature, purpose, and methods of economics. The conclusion is important and a bit ironic because it is drawn from a survey of the writings of the pre-eminent economist in the period in which economists were coming into their greatest prestige. The first Nobel Prize in Economic Sciences was awarded in 1969, the publication year of the last article covered in our review. The next year, 1970, our subject Paul Samuelson received the prize, “*for the scientific work through which he has developed static and dynamic economic theory and actively contributed to raising the level of analysis in economic science.*”

The unresolved questions include: Is mathematics a sufficient language for economics? Can economists, as economists, provide guidance for citizens and officials on public affairs? This second question is Stigler’s – On what basis do economists qualify to preach?

In the modern era science is thought to deal with observables. Samuelson believed that economics was a science, that mathematics was the best language for economic science, but mathematical analysis (theory) was properly the handmaiden of observable facts. He wrote in the first edition of *Economics*:

Properly understood, therefore, theory and observation, deduction and induction cannot be in conflict. Like eggs, there are only two kinds of theories: good ones and bad ones. And the test of a theory's goodness is its usefulness in illuminating observational reality. Its logical elegance and fine-spun beauty are irrelevant. Consequently, when a student says, "That's all right in theory but not in practice," he really means "That's not all right in theory," or else he is talking nonsense (1948, p. 8).

In the introduction to *Foundations* he invited readers to envision a unified (foundational) economic theory that would overcome the barrenness and "unmistakable signs of decadence which were clearly present in economic thought prior to 1930" (1983 [1947], p.4). The new methods on display in *Foundations* would yield *meaningful theorems*, i.e., hypotheses about empirical data "which could conceivably be refuted, if only under ideal conditions" (1983 [1947], p.4).

Samuelson famously argued (1952) that mathematics is language and thus basically no different from English. Use of mathematics is neither necessary nor sufficient for success as an economic theorist. However, theorists using mathematics were more likely to be successful than those who did not. In short, mathematics facilitates development of good theory.

Samuelson's first article on the public goods problem was motivated by concern to demonstrate the usefulness of mathematics for economic analysis. We have seen, though, that through the ensuing dialogue with other economics writing in the same area, English prose tended to supplant mathematics. Ultimately, terms such as "collective consumption goods" refer to goods and services such as education or roads, not to Greek letters. Samuelson's own claim that mathematics is not sufficient for economics, along with his other statement about economics being an empirical science, was an acknowledgment of Stephen Enke's point that "spinning of theories, with little reference to the real world, can retard progress in economics and bring the

profession into disrepute among those who must apply economic theories to problem areas” (1955, p. 131).

Most economists who have written on the public goods problem have seen this literature either as a normative theory of the appropriate division of labor between the public and private sectors, or as a positive theory of the functioning of government. Lief Johansen (1965), whose work Samuelson saw as compatible with his own, put it this way:

In the first place the attempt may be made to establish a theory as to how public expenditure is in fact determined in an economic set-up such as, e.g., the contemporary Norwegian one. In the second place it would be possible to aim at formulating a more normative theory as to how one might achieve an optimal determination of the level of public expenditure (p. 124).

When Enke pointed out that many services actually provided by governments did not fit Samuelson’s definition of non-rival collective consumption goods, Samuelson became trapped in a no-man’s land between normative theories of public expenditure and the positive theory that was to become known as “public choice.” He did not want to give up “legitimate” functions of government that failed to fit the normative theory. But he also did not choose to descend into what Julius Margolis referred to as “the murky waters of political sociology.” He was left with what had been his original purpose in writing “The Pure Theory of Public Expenditure,” which was to demonstrate the usefulness of mathematics as the language in which to write economic theory. Public expenditures were merely a vehicle for this demonstration.

Pickhardt (2006) points out that Samuelson did no additional work on public goods theory after 1969. We might also note that what he wrote between 1955 and 1969 was not new analysis, but concerned the interpretation and implications of his 1954 analysis. The mathematics of “The Pure Theory of Public Expenditure” translated nicely into the diagrams of “Diagrammatic Exposition of a Theory of Public Expenditure.” But neither translated well into English language descriptions of actual or ideal government activities.

A pair of two-fold hierarchies concerning the purpose of economic analysis is evident in Samuelson’s work on public goods. The first is that the theorems of welfare economics are applicable only after the problem of full employment has been resolved. This is the “neoclassical synthesis.” “If modern economics does its task so well that unemployment and inflation are

substantially banished from democratic societies, then its importance will wither away and the traditional economics (whose concern is wise allocation of fully employed resources) will really come into its own – almost for the first time” (1958b, p. 12).

The second hierarchy is that of non-scientific ethics having priority over scientific economics through the social welfare function. Just as the principles of traditional economics come into play only once non-inflationary full employment is attained, the *optimum optimorum* can be identified only once income is distributed equitably. The irony here is that what is most important is least subject to rigorous analysis. Ethics trumps efficiency; yet ethics is not scientific, so a modern social scientist has little to say about its substance. “Economics cannot deduce a social welfare function; what it can do is neutrally interpret any arbitrarily specified welfare function” (1955, p. 353). One simply presumes that society’s ethical standard is equality of the marginal “social welfare significance” of every good across all persons.

One could be forgiven for asking after all this if the queen of the social sciences is wearing a gown. Looking back over the history of economics prior to 1947, Samuelson saw as representative an economist who:

has consoled himself for his barren results with the thought that he was forging tools which would eventually yield fruit. The promise is always in the future; we are like highly trained athletes who never run a race, and in consequence grow stale. It is still too early to determine whether the innovations in thought of the last decade will have stemmed the unmistakable signs of decadence which were clearly present in economic thought prior to 1930 (1983 [1947], p. 4).

Put this alongside Samuelson’s statement two decades hence – “If experts remain nihilistic about algorithms to allocate public goods, and if all but a knife-edge of reality falls in that domain, nihilism about most of economics, rather than merely public finance, seems to be implied” (1969, p. 109). According to Samuelson himself the answer seems to have been that the queen of social sciences was no better clothed in 1969 than previously. The project of mathematizing and formalizing economics had not brought progress, unless one counts arriving at nihilism as progress.

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