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A PURE THEORY OF LOCAL EXPENDITURES[1]

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ONE of the most important recent developments in the area of "applied economic theory" has been the work of Musgrave and Samuelson in public finance theory.[2] The two writers agree on what is probably the major point under investigation, namely, that no "market type" solution exists to determine the level of expenditures on public goods. Seemingly, we are faced with the problem of having a rather large portion of our national income allocated in a "non-optimal" way when compared with the private sector.

This discussion will show that the Musgrave-Samuelson analysis, which is valid for federal expenditures, need not apply to local expenditures. The plan of the discussion is first to restate the assumptions made by Musgrave and Samuelson and the central problems with which they deal. After looking at a key difference between the federal versus local cases, I shall present a simple model. This model yields a solution for the level of expenditures for local public goods which reflects the preferences of the population more adequately than they can be reflected at the national level. The assumptions of the model will then be relaxed to see what implications are involved. Finally, policy considerations will be discussed.

THE THEORETICAL ISSUE

Samuelson has defined public goods as "*collective consumption goods* $(X_n + 1, \ldots, X_n + n)$ which all enjoy in common in the sense that each individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good, so that $X_n + j = X_n^i + j$ simultaneously for each and every ith individual and each collective good."[3] While definitions are a matter of choice, it is worth noting that "consumption" has a much broader meaning here than in the usual sense of the term. Not only does it imply that the act of consumption by one person does not diminish the opportunities for consumption by another but it also allows this consumption to be in another form. For example, while the residents of a new government housing project are made better off, benefits also accrue to other residents of the community in the form of the external economies of slum clearance.[4] Thus many goods that appear to lack the attributes of public goods may

[1] I am grateful for the comments of my colleagues Karl de Schweinitz, Robert Eisner, and Robert Strotz, and those of Martin Bailey, of the University of Chicago.

[2] Richard A. Musgrave, "The Voluntary Exchange Theory of Public Economy," *Quarterly Journal of Economics*, LII (February, 1939), 213–17; "A Multiple Theory of the Budget," paper read at the Econometric Society annual meeting (December, 1955); and his forthcoming book, *The Theory of Public Economy;* Paul A. Samuelson, "The Pure Theory of Public Expenditures," *Review of Economics and Statistics*, XXXVI, No. 4 (November, 1954), 387–89, and "Diagrammatic Exposition of a Pure Theory of Public Expenditures," *ibid.*, XXXVII, No. 4 (November, 1955), 350–56.

[3] "The Pure Theory . . . ," *op. cit.*, p. 387.

[4] Samuelson allows for this when he states that "one man's circus may be another man's poison," referring, of course, to public goods ("Diagrammatic Exposition . . . ," *op. cit.*, p. 351).

properly be considered public if consumption is defined to include these external economies.[5]

A definition alternative to Samuelson's might be simply that a public good is one which should be produced, but for which there is no feasible method of charging the consumers. This is less elegant, but has the advantage that it allows for the objections of Enke and Margolis.[6] This definition, unfortunately, does not remove any of the problems faced by Musgrave and Samuelson.

The core problem with which both Musgrave and Samuelson deal concerns the mechanism by which consumer-voters register their preferences for public goods. The consumer is, in a sense, surrounded by a government whose objective it is to ascertain his wants for public goods and tax him accordingly. To use Alchian's term, the government's revenue-expenditure pattern for goods and services is expected to "adapt to" consumers' preferences.[7] Both Musgrave and Samuelson have shown that, in the vertically additive nature of voluntary demand curves, this problem has only a conceptual solution. If all consumer-voters could somehow be forced to reveal their true preferences for public goods, then the amount of such goods to be produced and the appropriate benefits tax could be determined.[8] As things now stand, there is no mechanism to force the consumer-voter to state his true preferences; in fact, the "rational" consumer will understate his preferences and hope to enjoy the goods while avoiding the tax.

The current method of solving this problem operates, unsatisfactorily, through the political mechanism. The expenditure wants of a "typical voter" are somehow pictured. This objective on the expenditure side is then combined with an ability-to-pay principle on the revenue side, giving us our current budget. Yet in terms of a satisfactory theory of public finance, it would be desirable (1) to force the voter to reveal his preferences; (2) to be able to satisfy them in

[5] There seems to be a problem connected with the external-economies aspect of public goods. Surely a radio broadcast, like national defense, has the attribute that A's enjoyment leaves B no worse off; yet this does not imply that broadcasting should, in a normative sense, be a public good (the arbitrary manner in which the level of radio programs is determined aside). The difference between defense and broadcasting is subtle but important. In both cases there is a problem of determining the optimal level of outputs and the corresponding level of benefits taxes. In the broadcasting case, however, A may be quite willing to pay more taxes than B, even if both have the same "ability to pay" (assuming that the benefits are determinate). Defense is another question. Here A is not content that B should pay less. A makes the *social judgment* that B's preference *should* be the same. A's preference, expressed as an annual defense expenditure such as $42.7 billion and representing the majority view, thus determines the level of defense. Here the A's may feel that the B's *should pay* the same amount of benefits tax.

If it is argued that this case is typical of public goods, then, once the level is somehow set, the voluntary exchange approach and the benefit theory associated with it do not make sense. If the preceding analysis is correct, we are now back in the area of equity in terms of ability to pay.

[6] They argue that, for most of the goods supplied by governments, increased use by some consumer-voters leaves less available for other consumer-voters. Crowded highways and schools, as contrasted with national defense, may be cited as examples (see Stephen Enke, "More on the Misuse of Mathematics in Economics: A Rejoinder," *Review of Economics and Statistics*, XXXVII [May, 1955], 131–33; and Julius Margolis, "A Comment on the Pure Theory of Public Expenditure," *Review of Economics and Statistics*, XXXVII [November, 1955], 247–49).

[7] Armen A. Alchian, "Uncertainty, Evolution, and Economic Theory," *Journal of Political Economy*, LVIII (June, 1950), 211–21.

[8] The term "benefits tax" is used in contrast to the concept of taxation based on the "ability to pay," which really reduces to a notion that there is some "proper" distribution of income. Conceptually, this issue is separate from the problem of providing public goods and services (see Musgrave, "A Multiple Theory . . . ," *op. cit.*).

the same sense that a private goods market does; and (3) to tax him accordingly. The question arises whether there is any set of social institutions by which this goal can be approximated.

LOCAL EXPENDITURES

Musgrave and Samuelson implicitly assume that expenditures are handled at the central government level. However, the provision of such governmental services as police and fire protection, education, hospitals, and courts does not necessarily involve federal activity.[9] Many of these goods are provided by local governments. It is worthwhile to look briefly at the magnitude of these expenditures.[10]

Historically, local expenditures have exceeded those of the federal government. The thirties were the first peacetime years in which federal expenditures began to pull away from local expenditures. Even during the fiscal year 1954, federal expenditures on *goods and services exclusive of defense* amounted only to some 15 billions of dollars, while local expenditures during this same period amounted to some 17 billions of dollars. There is no need to quibble over which comparisons are relevant. The important point is that the often-neglected local expenditures are significant and, when viewed in terms of expenditures on goods and services only, take on even more significance. Hence an important question arises whether at this level of government any mechanism operates to insure that expenditures on these public goods approximate the proper level.

Consider for a moment the case of the city resident about to move to the suburbs. What variables will influence his choice of a municipality? If he has children, a high level of expenditures on schools may be important. Another person may prefer a community with a municipal golf course. The availability and quality of such facilities and services as beaches, parks, police protection, roads, and parking facilities will enter into the decision-making process. Of course, non-economic variables will also be considered, but this is of no concern at this point.

The consumer-voter may be viewed as picking that community which best satisfies his preference pattern for public goods. This is a major difference between central and local provision of public goods. At the central level the preferences of the consumer-voter are given, and the government tries to adjust to the pattern of these preferences, whereas at the local level various governments have their revenue and expenditure patterns more or less set.[11] Given these revenue and expenditure patterns, the consumer-voter moves to that community whose local government best satisfies his set of preferences. The greater the number of communities and the greater the variance among them, the closer the consumer will come to fully realizing his preference position.[12]

[9] The discussion that follows applies to local governments. It will be apparent as the argument proceeds that it also applies, with less force, to state governments.

[10] A question does arise as to just what are the proper expenditures to consider. Following Musgrave, I shall consider only expenditures on goods or services (his Branch I expenditures). Thus interest on the federal debt is not included. At the local level interest payments might be included, since they are considered payments for services currently used, such as those provided by roads and schools.

[11] This is an assumption about reality. In the extreme model that follows the patterns are assumed to be absolutely fixed.

[12] This is also true of many non-economic variables. Not only is the consumer-voter concerned with economic patterns, but he desires, for example, to associate with "nice" people. Again, the greater the number of communities, the closer he will come to satisfying his total preference function, which includes non-economic variables.

A LOCAL GOVERNMENT MODEL

The implications of the preceding argument may be shown by postulating an extreme model. Here the following assumptions are made:

1. Consumer-voters are fully mobile and will move to that community where their preference patterns, which are set, are best satisfied.

2. Consumer-voters are assumed to have full knowledge of differences among revenue and expenditure patterns and to react to these differences.

3. There are a large number of communities in which the consumer-voters may choose to live.

4. Restrictions due to employment opportunities are not considered. It may be assumed that all persons are living on dividend income.

5. The public services supplied exhibit no external economies or diseconomies between communities.

Assumptions 6 and 7 to follow are less familiar and require brief explanations:

6. For every pattern of community services set by, say, a city manager who follows the preferences of the older residents of the community, there is an optimal community size. This optimum is defined in terms of the number of residents for which this bundle of services can be produced at the lowest average cost. This, of course, is closely analogous to the low point of a firm's average cost curve. Such a cost function implies that some factor or resource is fixed. If this were not so, there would be no logical reason to limit community size, given the preference patterns. In the same sense that the average cost curve has a minimum for one firm but can be reproduced by another there is seemingly no reason why a duplicate community cannot exist. The assumption that some factor is fixed explains why it is not possible for the community in question to double its size by growth. The factor may be the limited land area of a suburban community, combined with a set of zoning laws against apartment buildings. It may be the local beach, whose capacity is limited. Anything of this nature will provide a restraint.

In order to see how this restraint works, let us consider the beach problem. Suppose the preference patterns of the community are such that the optimum size population is 13,000. Within this set of preferences there is a certain demand per family for beach space. This demand is such that at 13,000 population a 500-yard beach is required. If the actual length of the beach is, say, 600 yards, then it is not possible to realize this preference pattern with twice the optimum population, since there would be too little beach space by 400 yards.

The assumption of a fixed factor is necessary, as will be shown later, in order to get a determinate number of communities. It also has the advantage of introducing a realistic restraint into the model.

7. The last assumption is that communities below the optimum size seek to attract new residents to lower average costs. Those above optimum size do just the opposite. Those at an optimum try to keep their populations constant.

This assumption needs to be amplified. Clearly, communities below the optimum size, through chambers of commerce or other agencies, seek to attract new residents. This is best exemplified by the housing developments in some suburban areas, such as Park Forest in the Chicago area and Levittown in the New York area, which need to reach an optimum size. The same is true of communities that try to attract manufacturing indus-

tries by setting up certain facilities and getting an optimum number of firms to move into the industrially zoned area.

The case of the city that is too large and tries to get rid of residents is more difficult to imagine. No alderman in his right political mind would ever admit that the city is too big. Nevertheless, economic forces are at work to push people out of it. Every resident who moves to the suburbs to find better schools, more parks, and so forth, is reacting, in part, against the pattern the city has to offer.

The case of the community which is at the optimum size and tries to remain so is not hard to visualize. Again proper zoning laws, implicit agreements among realtors, and the like are sufficient to keep the population stable.

Except when this system is in equilibrium, there will be a subset of consumer-voters who are discontented with the patterns of their community. Another set will be satisfied. Given the assumption about mobility and the other assumptions listed previously, movement will take place out of the communities of greater than optimal size into the communities of less than optimal size. The consumer-voter moves to the community that satisfies his preference pattern.

The act of moving or failing to move is crucial. Moving or failing to move replaces the usual market test of willingness to buy a good and reveals the consumer-voter's demand for public goods. Thus each locality has a revenue and expenditure pattern that reflects the desires of its residents. The next step is to see what this implies for the allocation of public goods at the local level.

Each city manager now has a certain demand for n local public goods. In supplying these goods, he and $m - 1$ other city managers may be considered as going to a national market and bidding for the appropriate units of service of each kind: so many units of police for the ith community; twice that number for the jth community; and so on. The demand on the public goods market for each of the n commodities will be the sum of the demands of the m communities. In the limit, as shown in a less realistic model to be developed later, this total demand will approximate the demand that represents the true preferences of the consumer-voters—that is, the demand they would reveal, if they were forced, somehow, to state their true preferences.[13] In this model there is no attempt on the part of local governments to "adapt to" the preferences of consumer-voters. Instead, those local governments that attract the optimum number of residents may be viewed as being "adopted by" the economic system.[14]

A COMPARISON MODEL

It is interesting to contrast the results of the preceding model with those of an even more severe model in order to see how these results differ from the normal market result. It is convenient to look at this severe model by developing its private-market counterpart. First assume that there are no public goods, only private ones. The preferences for these goods can be expressed as one of n patterns. Let a law be passed that all persons living in any one of the communities shall spend their money in the particular pattern described for that community by law. Given our earlier assumptions 1 through 5, it follows that, if the consum-

[13] The word "approximate" is used in recognition of the limitations of this model, and of the more severe model to be developed shortly, with respect to the cost of mobility. This issue will be discussed later.

[14] See Alchian, *op. cit.*

ers move to the community whose law happens to fit their preference pattern, they will be at their optimum. The n communities, in turn, will then send their buyers to market to purchase the goods for the consumer-voters in their community. Since this is simply a lumping together of all similar tastes for the purpose of making joint purchases, the allocation of resources will be the same as it would be if normal market forces operated. This conceptual experiment is the equivalent of substituting the city manager for the broker or middleman.

Now turn the argument around and consider only public goods. Assume with Musgrave that the costs of additional services are constant.[15] Further, assume that a doubling of the population means doubling the amount of services required. Let the number of communities be infinite and let each announce a different pattern of expenditures on public goods. Define an empty community as one that fails to satisfy anybody's preference pattern. Given these assumptions, including the earlier assumptions 1 through 5, the consumer-voters will move to that community which *exactly* satisfies their preferences. This must be true, since a one-person community is allowed. The sum of the demands of the n communities reflects the demand for local public services. In this model the demand is exactly the same as it would be if it were determined by normal market forces.

However, this severe model does not make much sense. The number of communities is indeterminate. There is no reason why the number of communities will not be equal to the population, since each voter can find the one that exactly fits his preferences. Unless some sociological variable is introduced, this may reduce the solution of the problem of allocating public goods to the trite one of making each person his own municipal government. Hence this model is not even a first approximation of reality. It is presented to show the assumptions needed in a model of local government expenditures, which yields the same optimal allocation that a private market would.

[15] Musgrave, "Voluntary Exchange . . . ," *op. cit.*

THE LOCAL GOVERNMENT MODEL RE-EXAMINED

The first model, described by the first five assumptions together with assumptions 6 and 7, falls short of this optimum. An example will serve to show why this is the case.

Let us return to the community with the 500-yard beach. By assumption, its optimum population was set at 13,000, given its preference patterns. Suppose that some people in addition to the optimal 13,000 would choose this community if it were available. Since they cannot move into this area, they must accept the next best substitute.[16] If a perfect substitute is found, no problem exists. If one is not found, then the failure to reach the optimal preference position and the substitution of a lower position becomes a matter of degree. In so far as there are a number of communities with similar revenue and expenditure patterns, the solution will approximate the ideal "market" solution.

Two related points need to be mentioned to show the allocative results of this model: (1) changes in the costs of one of the public services will cause changes in the quantity produced; (2) the

[16] In the constant cost model with an infinite number of communities this problem does not arise, since the number of beaches can be doubled or a person can find another community that is a duplicate of his now filled first choice.

costs of moving from community to community should be recognized. Both points can be illustrated in one example.

Suppose lifeguards throughout the country organize and succeed in raising their wages. Total taxes in communities with beaches will rise. Now residents who are largely indifferent to beaches will be forced to make a decision. Is the saving of this added tax worth the cost of moving to a community with little or no beach? Obviously, this decision depends on many factors, among which the availability of and proximity to a suitable substitute community is important. If enough people leave communities with beaches and move to communities without beaches, the total amount of lifeguard services used will fall. These models then, unlike their private-market counterpart, have mobility as a cost of registering demand. The higher this cost, *ceteris paribus*, the less optimal the allocation of resources.

This distinction should not be blown out of proportion. Actually, the cost of registering demand comes through the introduction of space into the economy. Yet space affects the allocation not only of resources supplied by local governments but of those supplied by the private market as well. Every time available resources or production techniques change, a new location becomes optimal for the firm. Indeed, the very concept of the shopping trip shows that the consumer does pay a cost to register his demand for private goods. In fact, Koopmans has stated that the nature of the assignment problem is such that in a space economy with transport costs there is *no* general equilibrium solution as set by market forces.[17]

[17] Tjalling Koopmans, "Mathematical Groundwork of Economic Optimization Theories," paper read at the annual meeting of the Econometric Society (December, 1954).

Thus the problems stated by this model are not unique; they have their counterpart in the private market. We are maximizing within the framework of the resources available. If production functions show constant returns to scale with generally diminishing factor returns, and if indifference curves are regularly convex, an optimal solution is possible. On the production side it is assumed that communities are forced to keep production costs at a minimum either through the efficiency of city managers or through competition from other communities.[18] Given this, on the demand side we may note with Samuelson that "each individual, in seeking as a competitive buyer to get to the highest level of indifference subject to given prices and *tax*, would be led as if by an Invisible Hand to the grand solution of the social maximum position."[19] Just as the consumer may be visualized as walking to a private market place to buy his goods, the prices of which are set, we place him in the position of walking to a community where the prices (taxes) of community services are set. Both trips take the consumer to market. There is no way in which the consumer can avoid revealing his preferences in a spatial economy. Spatial mobility provides the local public-goods counterpart to the private market's shopping trip.

[18] In this model and in reality, the city manager or elected official who is not able to keep his costs (taxes) low compared with those of similar communities will find himself out of a job. As an institutional observation, it may well be that city managers are under greater pressure to minimize costs than their private-market counterparts—firm managers. This follows from (1) the reluctance of the public to pay taxes and, what may be more important, (2) the fact that the costs of competitors—other communities—are a matter of public record and may easily be compared.

[19] "The Pure Theory . . . ," *op. cit.*, p. 388. (Italics mine.)

EXTERNAL ECONOMIES AND MOBILITY

Relaxing assumption 5 has some interesting implications. There are obvious external economies and diseconomies between communities. My community is better off if its neighbor sprays trees to prevent Dutch elm disease. On the other hand, my community is worse off if the neighboring community has inadequate law enforcement.

In cases in which the external economies and diseconomies are of sufficient importance, some form of integration may be indicated.[20] Not all aspects of law enforcement are adequately handled at the local level. The function of the sheriff, state police, and the FBI—as contrasted with the local police—may be cited as resulting from a need for integration. In real life the diseconomies are minimized in so far as communities reflecting the same socioeconomic preferences are contiguous. Suburban agglomerations such as Westchester, the North Shore, and the Main Line are, in part, evidence of these external economies and diseconomies.

Assumptions 1 and 2 should be checked against reality. Consumer-voters do not have perfect knowledge and set preferences, nor are they perfectly mobile. The question is how do people actually react in choosing a community. There has been very little empirical study of the motivations of people in choosing a community. Such studies as have been undertaken seem to indicate a surprising awareness of differing revenue and expenditure patterns.[21] The general disdain with which proposals to integrate municipalities are met seems to reflect, in part, the fear that local revenue-expenditure patterns will be lost as communities are merged into a metropolitan area.

POLICY IMPLICATIONS

The preceding analysis has policy implications for municipal integration, provision for mobility, and set local revenue and expenditure patterns. These implications are worth brief consideration.

On the usual economic welfare grounds, municipal integration is justified only if more of any service is forthcoming at the same total cost and without reduction of any other service. A general reduction of costs along with a reduction in one or more of the services provided cannot be justified on economic grounds unless the social welfare function is known. For example, those who argue for a metropolitan police force instead of local police cannot prove their case on purely economic grounds.[22] If one of the communities were to receive less police protection after integration than it received before, integration could be objected to as a violation of consumers' choise.

Policies that promote residential mobility and increase the knowledge of the consumer-voter will improve the allocation of government expenditures in the same sense that mobility among jobs and knowledge relevant to the location of industry and labor improve the allocation of private resources.

Finally, we may raise the normative question whether local governments *should*, to the extent possible, have a fixed revenue-expenditure pattern. In a large, dynamic metropolis this may be

[20] I am grateful to Stanley Long and Donald Markwalder for suggesting this point.

[21] See Wendell Bell, "Familism and Suburbanization: One Test of the Choice Hypothesis," a paper read at the annual meeting of the American Sociological Society, Washington, D.C., August, 1955. Forthcoming in *Rural Sociology*, December, 1956.

[22] For example, in Cook County—the Chicago area—Sheriff Joseph Lohman argues for such a metropolitan police force.

impossible. Perhaps it could more appropriately be considered by rural and suburban communities.

CONCLUSION

It is useful in closing to restate the problem as Samuelson sees it:

> *However, no decentralized pricing system can serve to determine optimally these levels of collective consumption.* Other kinds of "voting" or "signaling" would have to be tried. . . . Of course utopian voting and signaling schemes can be imagined. . . . 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.[23]

It is the contention of this article that, for a substantial portion of collective or public goods, this problem *does have* a conceptual solution. If consumer-voters are fully mobile, the appropriate local governments, whose revenue-expenditure patterns are set, are adopted by the consumer-voters. While the solution may not be perfect because of institutional rigidities, this does not invalidate its importance. The solution, like a general equilibrium solution for a private spatial economy, is the best that can be obtained given preferences and resource endowments.

Those who are tempted to compare this model with the competitive private model may be disappointed. Those who compare the reality described by this model with the reality of the competitive model—given the degree of monopoly, friction, and so forth—*may* find that local government represents a sector where the allocation of public goods (as a reflection of the preferences of the population) need not take a back seat to the private sector.

[23] "The Pure Theory . . . ," *op. cit.*, pp. 388–89.

[Footnotes]

[2] **The Voluntary Exchange Theory of Public Economy**
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