NBER WORKING PAPER SERIES

THE THEORY OF LOCAL PUBLIC GOODS TWENTY-FIVE YEARS AFTER TIEBOUT: A PERSPECTIVE

Joseph E. Stiglitz

Working Paper No. 954

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge MA 02138

August 1982

NBER Working Paper #954
August 1982

The Theory of Local Public Goods Twenty-Five Years After Tiebout: A Perspective

ABSTRACT

This paper asks, under what conditions can the Fundamental Theorem of Welfare Economics be extended to economies with local public goods? We show that there are some fairly restrictive sets of assumptions under which a competitive local public goods equilibrium (if it exists) is efficient; more generally, however, competitive local public goods equilibria may be inefficient in the allocation of individuals among communities, in the number of communities, and in the level and kinds of public goods provided.

The primary sources of inefficiency are identified and analyzed; these "market" failures are closely related to some important policy issues concerning, for instance, urban concentralization, fiscal decentralization, and regional redistribution. In communities in which landlords control the public sector, the level and kinds of public goods provided may be incorrect, and what goods are provided are supplied inefficiently. In contrast, in communities in which renters control the public sector, there are no incentives for efficiency in the supply of public goods. Because of what we refer to as rental capitalization, there may in fact be perverse incentives with respect to the kinds of public goods or "bads" provided.

Not only is it the case that not every competitive equilibrium is Pareto optimal, but not every Pareto efficient allocation can be sustained by a competitive local public goods equilibrium (with the appropriate lump sum redistributions).

Just as the Fundamental Theorem of Welfare Economics does not adequately reflect the vices and virtues of competition in the market economy with purely private goods, so too here: the virtues of a decentralized mechanism for providing public goods may be vastly underestimated by our analysis.

Professor Joseph E. Stiglitz
Department of Economics, Dickinson Hall
Princeton University
Princeton, NJ 08544 (609) 452-4014

THE THEORY OF LOCAL PUBLIC GOODS TWENTY-FIVE YEARS AFTER TIEBOUT: A PERSPECTIVE*

by

Joseph E. Stiglitz

I. Introduction

It has long been recognized that there are three fundamental problems associated with the provision of public goods:

1. The revelation problem: for private goods, individuals reveal their preferences in the process of purchasing goods; for public goods, preferences must be elicited in some other way. If individuals' payments for public goods (e.g., taxes) depend on their declared preferences, they will have an incentive to misrepresent their preferences.

2. The social choice problem: Arrow established that there does not exist, in general, a social choice mechanism satisfying the commonly accepted desiderata of (i) non-dictatorship; (ii) transitivity; (iii) independence of irrelevant alternatives; and (iv) Pareto optimality.

3. The management of the public good: while for private goods, there are strong incentives for firms to provide the goods which individuals wish to purchase and to produce them efficiently, the incentives for citizens to obtain information to select good public managers, and the incentive for public managers to provide for the public good, are either absent or far from perfect.

Twenty-five years ago, Tiebout argued that, at least for those public goods which were supplied locally, if individuals were mobile among communities, all three problems could be resolved: by their choice of communities, they reveal their preference. Communities either provide the goods which indi-

---

* Paper originally presented at Peterkin Symposium, Rice University, April 16-17, 1981. Financial support from the National Science Foundation is gratefully acknowledged. The author is indebted to Peter Mieszkowski and Robin Lindsey for their helpful comments.

viduals wish -- and do so efficiently -- or individuals leave to other communities that provide public goods which are more in accord with their tastes and which provide these goods more efficiently. Competition among communities is thus like competition among firms for customers, and just as the latter leads to efficient resource allocations, so too does the former.

In the past twenty-five years a considerable body of literature has been devoted to assessing the validity of Tiebout's contention, both to generalizing Tiebout's model, to ascertaining its theoretical limitations, and to testing it empirically.

The objective of this paper is not to present a systematic survey of this voluminous literature.[1] Rather, I would like to return to the fundamental question posed by Tiebout a quarter of a century ago: what implications does the ability of individuals to choose a community have for the provision of public goods? Although there clearly is some similarity between competition among firms in the supply of private goods, and competition among local communities in the supply of public goods, is the analogy sufficiently close that the conclusion concerning Pareto optimality established for the former is also valid for the latter?

In the twenty-five years since Tiebout's original contributions, not only have we gained considerable understanding of the questions with which Tiebout was concerned but we have also learned much about the conditions under which private markets attain a Pareto efficient outcome. For instance, we know that (a) if there are incomplete futures or risk markets; (b) if there is imperfect information, and individuals can acquire information or if one individual's beliefs are affected by the actions of other individuals; or (c) if there

---

1. For a recent survey see P. Pestieau (1980). For another recent treatment of the subject, see Atkinson and Stiglitz (1980), Chapter 17.

are non-convexities in production which result in only a subset of the set of potential goods actually being produced; then the market allocation is in general not Pareto optimal.

The basic conclusion of this paper -- that it is only under very special and unreasonable assumptions that the process of individual choice among communities leads to Pareto optimality -- should thus come as no surprise. Yet I shall argue that Tiebout's insight into the importance of choice in the political process is an extremely important one, with numerous policy implications.

II. The Fundamental Theorem of Welfare Economics with Local Public Goods

The central result of modern welfare economics, generally referred to as the Fundamental Theorem of Welfare Economics, establishes conditions under which every competitive equilibrium is Pareto efficient, and under which every Pareto efficient allocation can be supported by a competitive equilibrium (with the appropriate lump sum redistributions).

Among the conditions which are conventionally imposed is that there are no public goods. In general, with pure public goods the market allocation will not be Pareto efficient. While Pareto efficiency requires that the sum of the marginal rates of substitution equal the marginal rate of transformation, in market equilibrium each individual will equate his own marginal rate of substitution with the price ratio (which equals the marginal rate of transformation in competitive equilibrium).

I am concerned here, however, with a class of public goods, which I shall refer to as local public goods, the benefits of which accrue only to those who belong to a particular group (which I shall call the community), and not to those who belong to other groups (communities) within the society. There is thus an element of "privateness" in local public goods; while within the community the

good is a pure public good, "between" communities it acts like a private good. Those outside the community receive no benefit. The concept is a natural one; the local public library in Princeton provides no benefits to the citizens of Houston, and conversely. The question with which I shall be concerned here is under what conditions will the Fundamental Theorem of Welfare Economics be valid for economies with local public goods.

At the outset, I should remark that the analysis presented here reflects only one of the two major strands which have evolved out of the work of Tiebout. In the analysis here, we shall assume that individuals can belong to only one community; they live, work, and play within their own community, and it supplies them with their public and private goods. In the other strand, individuals can belong to many groups: they may live in one community, work in another, and belong to a swimming club which provides one local public good, and to a tennis club which provides another. It is my conjecture that many of the results reported here also apply to this other environment, but a full treatment of this more general case is beyond the scope of this paper.[1]

Introducing local public goods requires a reexamination both of what is meant by Pareto efficiency, and what is meant by competitive (market) equilibrium. Both of these turn out to be complicated questions.

---

1. Thus, there is some suggestion that the communities implicit in our analysis are more like metropolitan regions than like suburban villages.

   It should be emphasized, however, that our analysis of local public goods, like Samuelson's analysis of pure public goods, is concerned with polar cases; just as there are few pure public goods, there are probably few pure local public goods. It is, however, only by analyzing these polar cases that one can understand the underlying structure of the problems posed by public goods.

2.1 The Notion of Pareto Efficiency

The basic definition of Pareto efficiency -- that no one can be made better off without making someone else worse off -- remains, of course, unchanged. Recent research in welfare economics has emphasized, however, the importance in defining and characterizing the set of Pareto efficient allocations of specifying clearly the information which is available (or more generally, the technology by which information may be acquired), and the set of admissible instruments (e.g., whether lump sum taxes can be employed to redistribute income, whether there are restrictions on the set of risk markets, etc.).[1]

Let me illustrate this point by means of a simple example. We have two groups in the population, those who like public goods and those who do not. There is a single private good, and all individuals have identical endowments of a good, I, which can be transformed either into a unit of the public good or of the private good. There are four cases to consider:

(i) There is perfect knowledge concerning who is a high demander, who is a low demander, and the government can restrict migration. Then Pareto efficiency entails a single community. The set of Pareto efficient allocations are those analyzed by Samuelson, where the sum of the marginal rates of substitution equal the marginal rate of transformation. Point A in Figure 1a represents the particular Pareto optimal allocation where a uniform wealth tax is imposed.

(ii) There is perfect knowledge concerning who is a high demander, who is a low demander, but migration cannot be restricted. By migrating, individuals

---

1. Some of these restrictions should, of course, be derived from more fundamental characteristics of the economy. Thus, the restrictions on the ability to employ differential lump sum taxes may be derived from restrictions on the information available to the government, its ability to differentiate among individuals; restrictions on the set of risk markets may be derived, either from assumptions concerning the transactions costs technology or informational assumptions.

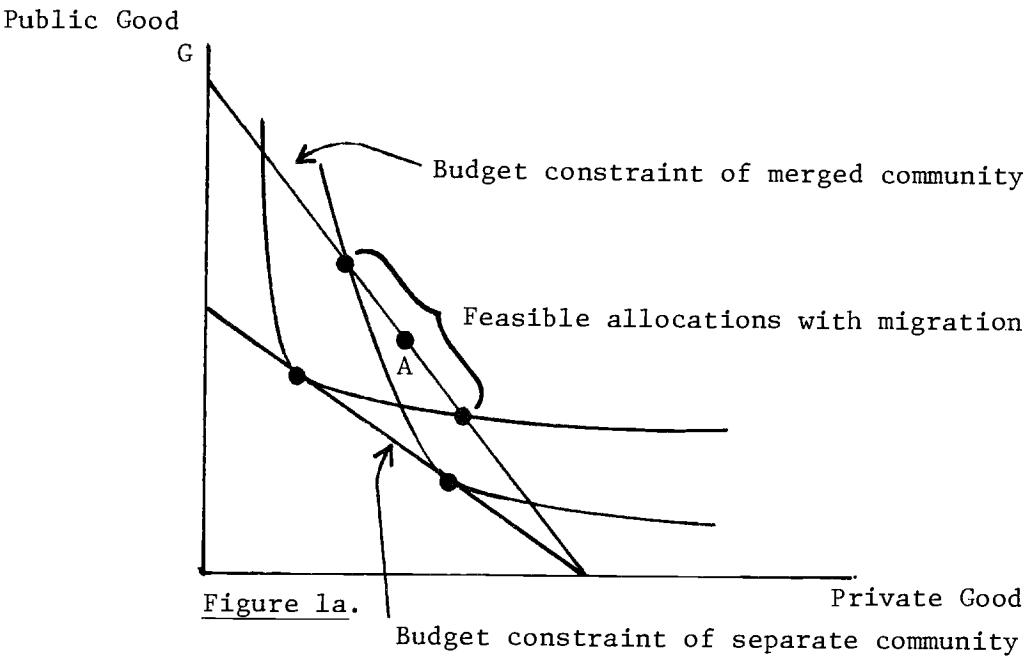
Public Good
G
Budget constraint of merged community
Feasible allocations with migration
A
Private Good
Budget constraint of separate community

Figure 1a.

can avoid paying any taxes imposed by a community on its residents.[1] Then the set of Pareto efficient allocations which can be supported is restricted. Thus, in Figure 1b point A is not an equilibrium. Pareto efficiency will require, in this case, discriminatory taxation (e.g., low demanders are at point C, high demanders at point B).

(iii) there is imperfect knowledge concerning who is a high demander, or discriminatory lump sum taxation is not allowed, and consumption (use) of the public good cannot be monitored. Migration cannot be restricted. Then, the only feasible tax (in this example) is a uniform lump sum tax; Pareto optimality may entail two communities (X and Y in Figure 1c); but if there is a single community, Pareto optimality will not, in general, entail the sum of the marginal rates of substitution equalling the marginal rate of transformation (D in Figure 1b).

(iv) under the same assumptions as (iii), if now use of the public good can be monitored, Pareto optimality may entail the use of a benefit tax, with a single community rather than two. The gain from the consolidation of the two communities into one exceeds the loss from the distortion associated with the benefit tax (low demanders consume less of the public good than is available (point H), even though there is zero marginal cost associated with their utilizing more of the public good). (See Figure 1c).[2] Thus, contrary to the popular view, which holds that benefit taxes for public goods are inefficient, since they restrict the consumption of something for which the marginal cost

---

1. If lump sum taxes can be imposed independent of residency, then the set of Pareto efficient allocations is the same as in (i) above.

2. Thus, the points F and H satisfy the self-selection constraints; the low demanders prefer H to F although high demanders prefer F to H.

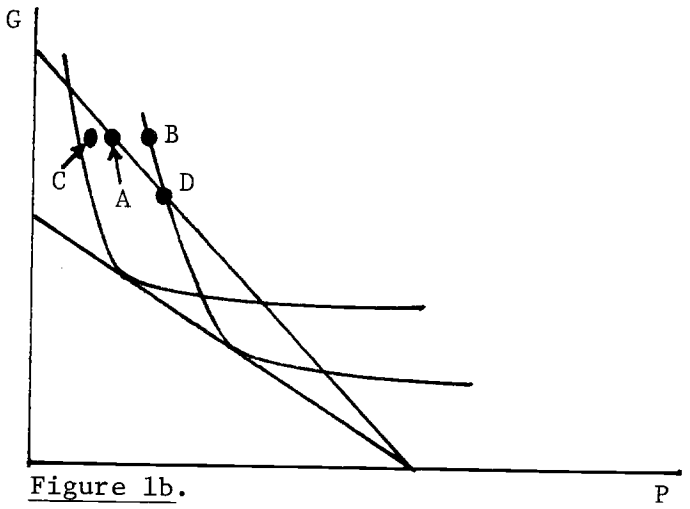

Figure 1b.

A: Pareto efficient with uniform lump sum tax and no migration.

With migration, and discriminatory lump sum tax, low demanders are at B, high demanders are at C.

With migration, and no discriminatory lump sum tax, all individuals are at D.

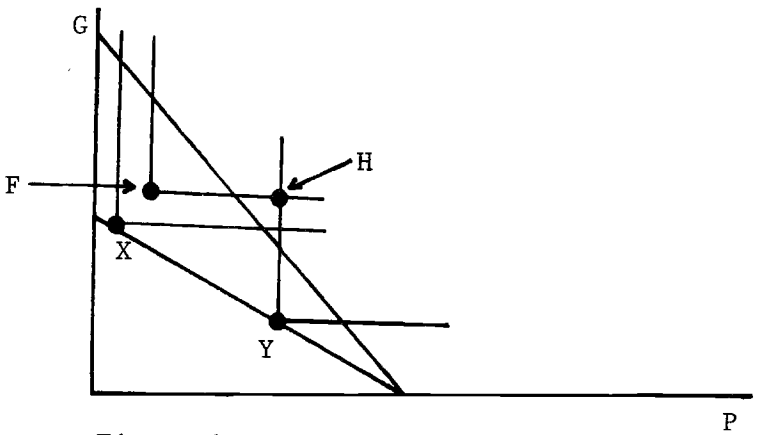

Figure 1c. Without discrimination, there will be two communities, at X and Y. Highly non-linear use tax, leading low demander to H and high demander to F, generates a Pareto improvement.

of consumption is zero, we show that, under these quite plausible conditions concerning the information available to the government, benefit taxes may be necessary for Pareto efficiency.

This example illustrates the critical role, in the analysis of the Pareto optimal allocations, of assumptions concerning the ability of the government to control migration (to restrict the establishment of new communities), and to discriminate among different citizens, either directly or indirectly (e.g., through benefit taxes).

A third characteristic of the economy that will play an important role in our subsequent exposition concerns "congestion." In the example just discussed, there is no congestion in the use of the public good, no diminishing returns to scale, of the kind that would result from increased transport costs in larger communities, and no diminishing returns in production, that would result from increasing the number of workers in a community with, say, fixed land size. That is why when there is perfect information concerning individuals, and when discriminatory taxes can be imposed, Pareto efficiency always entails there being a single community. If the "congestion" effects are strong enough, then even under the above conditions it may be desirable to have more than one community.

For any particular set of assumptions; e.g., concerning migration and the feasibility of discriminatory taxation, we can characterize the set of (constrained) Pareto efficient allocations. In evaluating whether a local public goods equilibrium (to be defined shortly) is Pareto efficient, we shall be particularly concerned with three questions: whether the number of communities is correct, whether the allocation of individuals among communities is correct, and whether the level of expenditures on various public goods within a community is correct.

2.2 The Nature of Competitive Equilibrium with Local Public Goods

The characterization of the local public goods equilibrium also requires us to specify clearly our assumptions concerning migration, the feasibility of discriminatory taxation, and the importance of congestion. In addition, we need to specify how the supply of public goods is determined, the nature of the political process, and the possibilities for "public entrepreneurship."

The "spirit" of the Tiebout conjecture is most appropriately captured, I think, by the free mobility assumption; although certain types of discrimination may be admissible, it is not permissible to discriminate between "original" inhabitants and migrants.

In the subsequent discussion, we shall employ two classes of models. In one, all resources are mobile. Each individual has an endowment of a vector of resources which he can trade with other individuals. A "community" is then a collection of individuals, which share in common a set of public goods. The individuals within the community interact in production. The "rules" of the community specify the relationship between the individual's endowments and his consumption of private goods.

In the second, there is one immobile resource, which we can think of as land. The different communities can be thought of as different islands. The critical distinction is then that when an individual moves from one community to another, he does not take his land. (He may still be able to enjoy some return to his land, if the "rules" of his original community allow those who contribute just land to the community to obtain a return.)

The free migration assumption imposes the requirement that, in equilibrium, an individual of a given type enjoy the same utility in all communities which they inhabit, and the "rules" of the communities which they do not inhabit

combined with the supply of public goods which these communities provide, generate a level of utility which is less than (or equal to) that level.

If we take as exogenous (a) the number of communities; and (b) the rules relating the levels of public goods expenditures and taxes to the number of individuals inhabiting the community; then the only question addressed in the analysis of equilibrium is that of the allocation of individuals among these communities. But one of the primary reasons for interest in the Tiebout mechanism is that individuals' choices convey information about their preferences, and -- so it is conjectured -- this in turn leads to an efficient determination of the level of public goods.

Thus, a complete analysis of the equilibrium requires a specification of the process by which the levels of public goods and taxes get determined. In various parts of this paper we take several alternative approaches:

(i) When there is unanimity on what course of action the government should take, then it is reasonable to assume that the action undertaken is that action which is unanimously favored. The central theorem of Subsection 3.1 establishes, in fact, a general condition under which there will be unanimity (even with communities with citizens of different tastes). On the other hand, in the special examples we investigate in Subsection 4.1 all individuals within a community are identical, and so unanimity is trivial.

(The determination of the level of public goods may still not be trivial; what individuals vote for will depend on their perceptions of the consequences -- either in terms of migration or land values -- of alternative tax-expenditure programs.)

(ii) When there are differences in view on what course of action the government should take, we shall assume the level of public goods reflects the prefer-

ences of the median voter.[1]

The concept of "competition" which is relevant for the analysis of local public goods equilibrium is not obvious. Three assumptions will be employed in the subsequent analysis.

(a) Utility Taking. Each community faces (or believes it faces) a perfectly horizontal schedule of individuals of each type. Each community is, in other words, a utility taker. This is the natural extension of wage-taking or price taking behavior for economies in which there are only private goods.

(b) Free Entry. Any entrepreneur can propose a new community, with a new set of rules.

(c) Monopolistic Competitive. Just as there is a widespread view that, when there are fixed costs of producing different commodities, a monopolistically competitive model may be more appropriate than a "perfectly" competitive model, so too here. Although there are many towns (firms), no town (product) is a perfect substitute for any other. There may be systematic biases in the number and variety of towns in the local public goods equilibrium, just as there are biases in the number of firms and the variety of goods they produce in the private goods equilibrium (Dixit-Stiglitz (1977), Stiglitz (forthcoming), Spence (1976), Salop (1979), and Lancaster (1975)).

---

1. We ignore the problems associated with preferences not being single peaked, as they often are in the kinds of situations being considered here. See Kramer (1973), Stiglitz (1974), and Slutsky (1977).

   We employ the median voter model because of its analytical simplicity. We make no judgment about the appropriateness of the model as a description of the determination of public goods at the local level.

III. Sufficient Conditions for the Efficiency of Local Public Goods Equilibrium

In the previous section, we attempted to clarify both what might be meant by a Pareto efficient allocation and a local public goods competitive equilibrium. There has been, since Tiebout's original paper, a widespread belief that local public goods equilibrium will in fact be Pareto efficient, and that every Pareto efficient allocation with local public goods can be supported by a local public goods competitive equilibrium. This, unfortunately, is not the case, and a major concern of this paper is to explain the major reasons why this is so.

First, however, it may be useful to begin with two situations where the local public goods competitive equilibrium is a constrained Pareto optimum. The central feature of both situations is that there is a sufficiently large number of communities, that the decision makers in each community take the level of utility of each type of individual as given; if the community offers a utility level below what a particular type of individual can obtain elsewhere, individuals of this type will all leave the community; if they offer a utility level in excess of what the type can obtain elsewhere, there is a flood of immigration.

3.1 Unanimity in the Provision of Public Goods[1]

We first show that with an infinite number of people of each type, and a sufficiently large number of islands,[2] the local public goods equilibrium (if it exists) is Pareto optimal. Moreover, when each type of individual takes the

---

1. The results discussed in this section are described in greater detail in Stiglitz (forthcoming b) and Atkinson and Stiglitz (1980).

2. Identical results obtain if all factors are mobile (i.e., there is no land) so long as there is an infinite number of people of each type.

utility level of other groups as given, there will be complete unanimity both about the level of expenditures on various public goods and the taxes by which those public goods are financed. This is so, even though, in general, communities will not be homogeneous, so long as there are productive interactions among individuals or so long as there are transport costs, and different individuals face different transport costs or have different utility functions for land. The focus on homogeneity in so much of the literature is simply a red herring.

To see this, we construct the utility possibilities frontier of the economy. This specifies the maximum amount of utility that can be attained by one type of individual given the level of utility of other individuals. Because of the free migration assumption, all individuals of a given type attain the same level of utility. (In the absence of public goods, we could have drawn a "factor price frontier" specifying the maximum level of factor price we could pay to one factor given the factor price paid to the other; as the relative factor price increases, the relative factor intensity decreases. Here the return to participating in a community includes not only the wage, but also the benefits of the public good.)[1]

To see how the utility possibilities schedule can be constructed, for simplicity, we focus on the case where there are only two groups in the population. Let N_i be the number of individuals of type i in the community, $N_1/N_2 = n$. Then for each value of N_1 and N_2 there will be a utility possibilities schedule as depicted in Figure 2a. Next, we construct the fixed

---

1. The analogy to "utility equivalent contracts" discussed in the sharecropping literature (Stiglitz (1974)) or the labor market literature (Stiglitz (1975)) should be immediate.

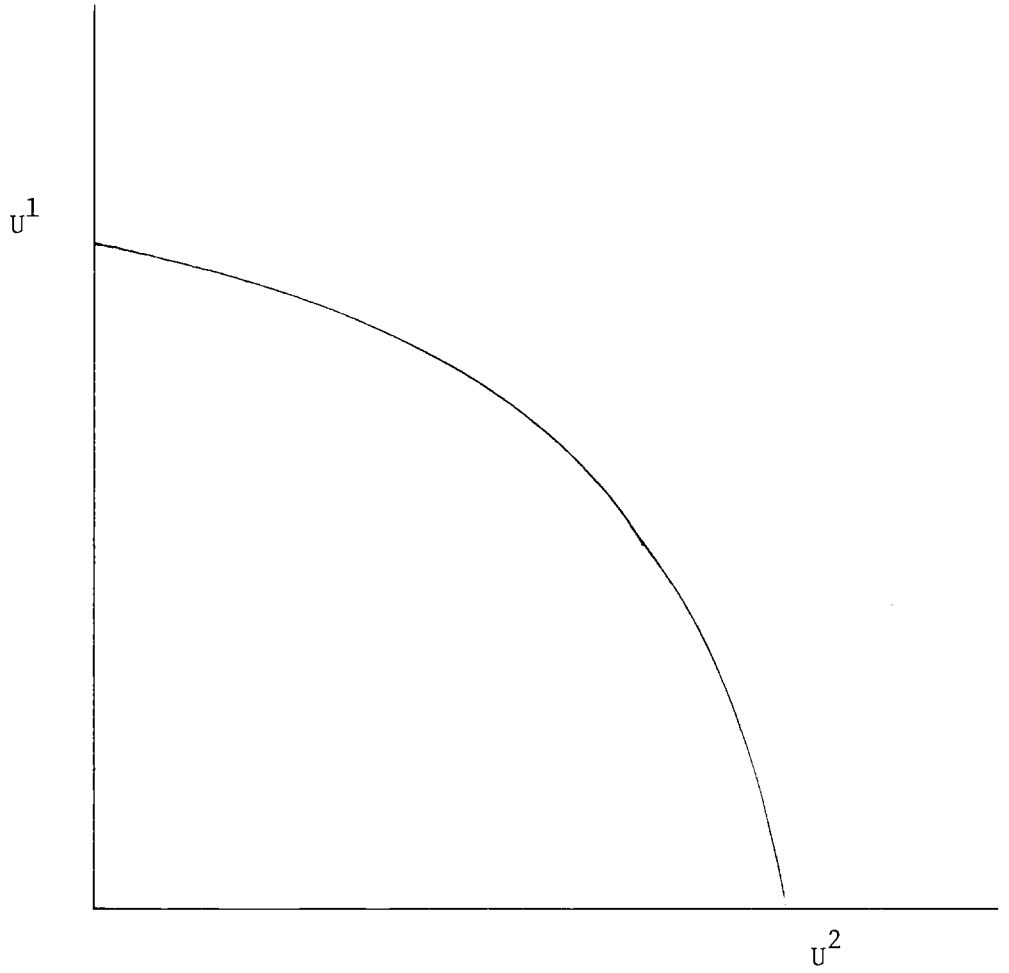

Figure 2a. Utility Possibilities Schedule: Fixed Size Island.

n-utility possibilities schedule, where we allow the number of individuals in the island to vary as we vary the levels of utility of say U_1. (This utility possibilities schedule may be constructed as the outer envelope of a set of utility possibilities schedules, each of which takes n and, say, $N_1 + N_2$, as fixed. See Figure 2b). Next, we construct the variable-n utility possibilities schedule, as the outer envelope of all of the fixed n utility possibilities schedules. Figures 2c and 2d illustrate two possible cases.

In Figure 2c the utility possibilities schedule (for each n) is concave.[1] The outer envelope, giving the utility possibilities schedule for the economy, may or may not be concave. Along the outer envelope, as we increase U_1/U_2, we decrease n.

We have thus constructed what is, in effect, a market demand curve for type 1 labor (relative to type 2). The market equilibrium is simply the intersection of this "demand curve" with the curve giving the relative supply (Figure 3a).

In Figure 2d the utility possibilities schedule (for each n) is convex. Clearly, the outer envelope will then be convex. As we have drawn it, the outer envelope (over a region at least) consists of a small n curve $(n = n_1)$ and a large n $(n = n_2)$ curve. These dominate intermediate values of n. Thus, for relative supplies of the two types of labor between n_1 and n_2 the levels of utility will be fixed at U_1^* and U_2^*; in equilibrium there will be two types of communities (one with $n = n_1$, and one with $n = n_2$). Changes in the ratio of the aggregate supplies of the two types will be reflected in the mix of the two communities (Figure 3b).

---

1. Even with concave utility functions, the utility possibilities schedule with fixed population may be convex. See Stiglitz (forthcoming b).

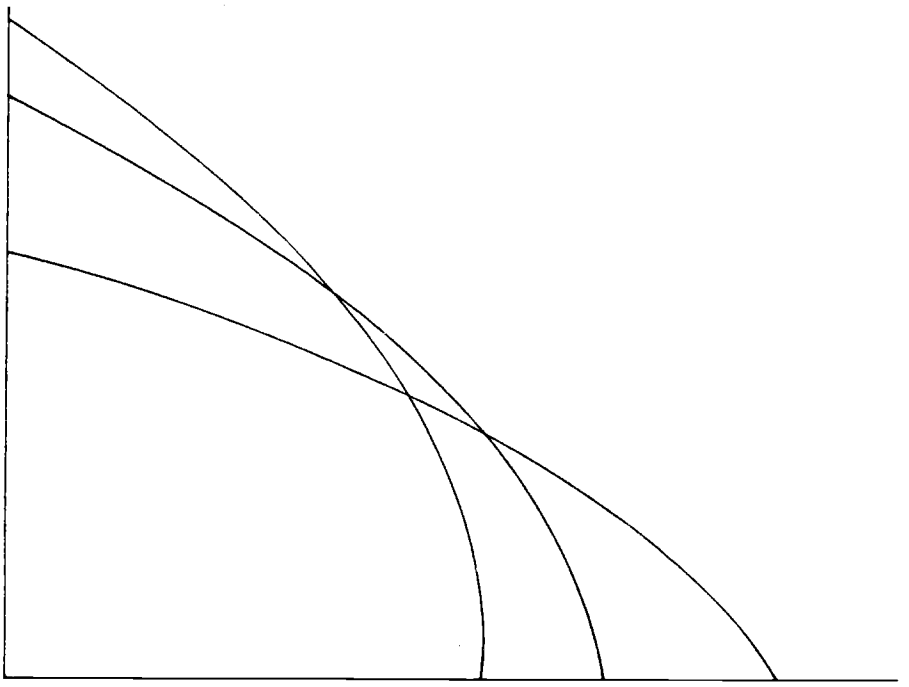

Figure 2b. Utility Possibilities Schedule for Fixed Ratio $n = N_1/N_2$

(Outer envelope of utility possibilities schedules with same N_1/N_2 but different scale.)

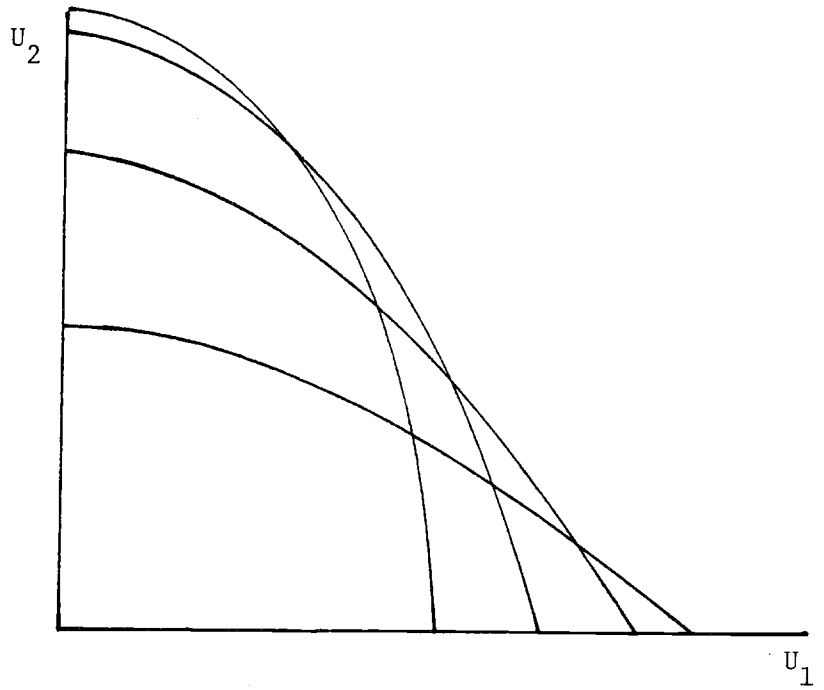

Figure 2c. Utility possibilities schedule with island size and ratio N_1/N_2 variable is outer envelope of fixed n utility possibilities schedule.

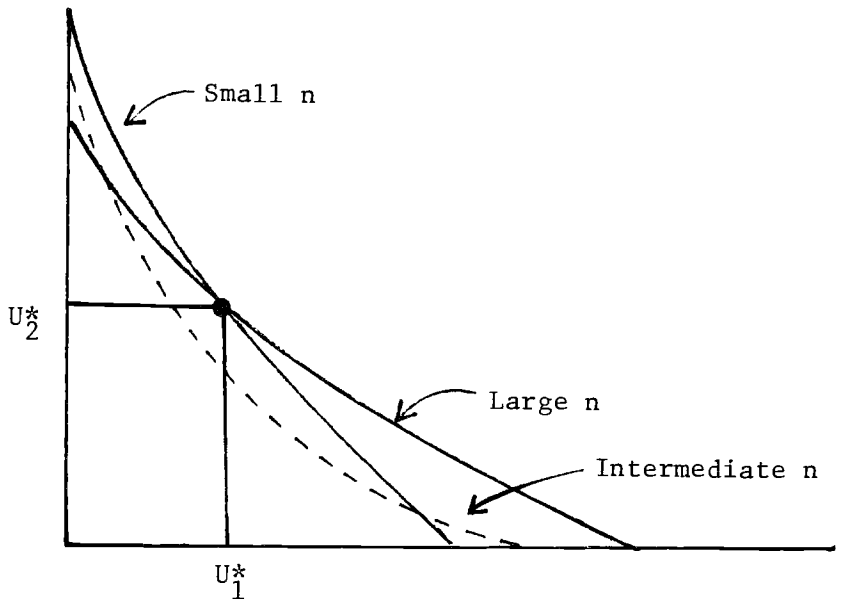

Figure 2d. Convex utility possibilities schedule: changes in relative supplies of two types of individuals leaves unchanged utility levels. (Intermediate values of n dominated.)

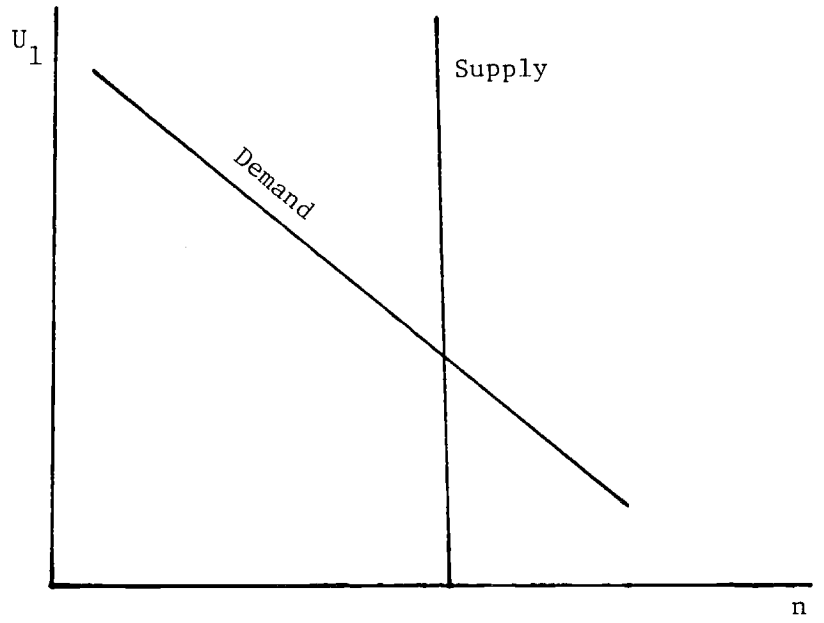

Figure 3a. Equilibrium as the intersection of demand and supply of labor of type 1.

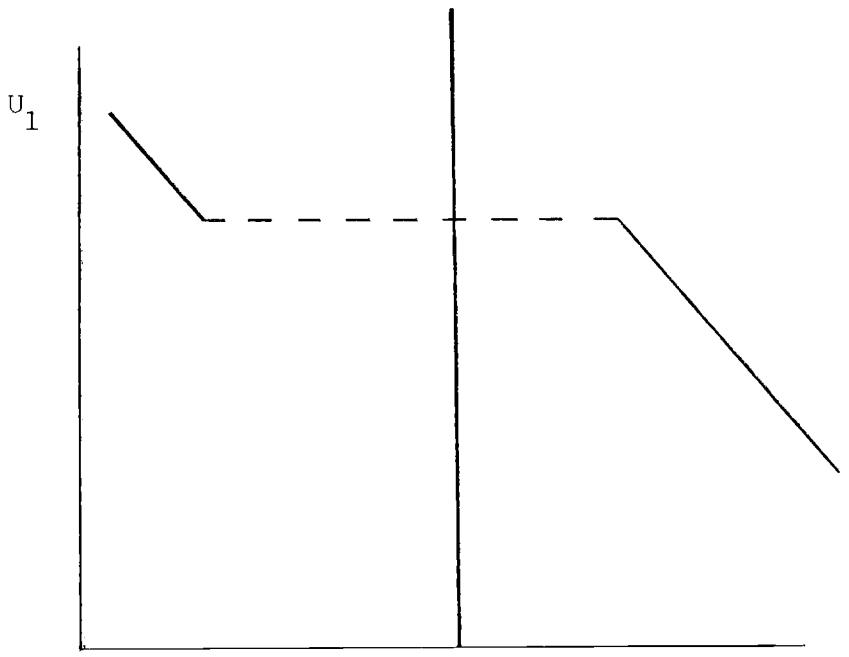

Figure 3b. Equilibrium as the intersection of demand and supply of labor: changes in relative supplies of different types of labor change mix of communities.

To see that the point we have depicted is in fact the equilibrium, observe that if any single group were to ask, what is the best that we could do, given what utility we need to offer to others to join (or remain in) our community, the best they could do is to have that resource allocation corresponding to the point on the utility possibilities schedule we have identified as the equilibrium. Moreover, since all groups would thus choose the same point, there is unanimity (even though underlying preferences may differ markedly). Finally, when all communities act in this way, the demands for the different kinds of labor in each community add up precisely to the supply.

Note, too, there is no scope for redistribution within this environment. Any community attempting to redistribute income against some group will find it without any of that group in its population.

Finally, we note that it is possible to show that even with well-behaved concave preferences and technology, the utility possibility schedule is not concave, as illustrated in Figure 4. If the equilibrium described earlier lies at a point within the convex portion of the utilities possibilities schedule, the ex ante expected utility can clearly be increased by having two sets of communities, and randomly assigning individuals to one or the other.[1]

3.2 Land Value Maximization

The second set of conditions in which the local public goods competitive equilibrium is efficient in its supply of public goods entails communities which choose the level of public goods to maximize the value of the land rent. Communities which provide more attractive public services will find that individuals are willing to pay higher land rents to live in the community. If each community is a utility taker (in the sense defined earlier) and finances the public goods through a land tax, then the level of rent which the ith individual

---

1. Under certain conditions, not only does social optimality (in the sense of maximizing ex ante expected utility) entail randomization, but so too will the market equilibrium. See Stiglitz (1982).

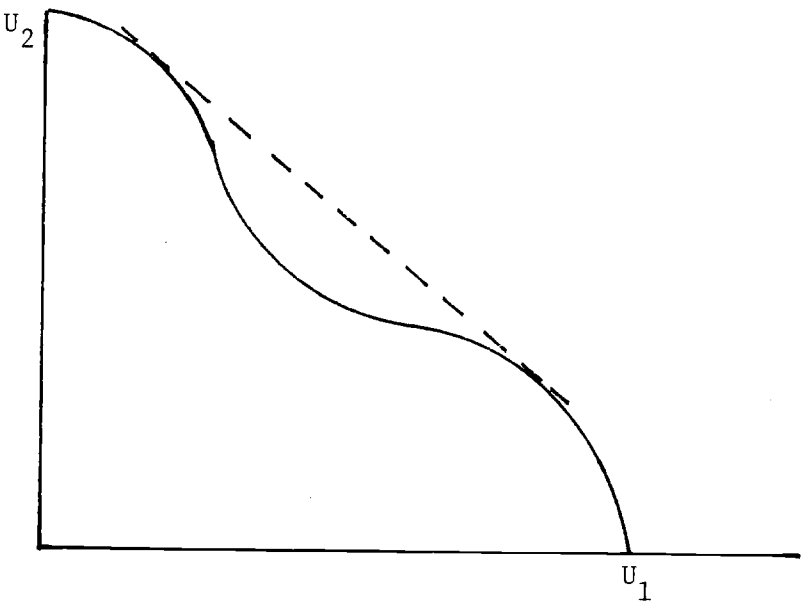

Figure 4. Convex utility possibilities schedule: randomization improves ex ante expected utility of risk averse individuals.

is willing to pay, r^i, is defined implicitly by the modified indirect utility function

$$(1) \qquad U^i(Y^i, G, r^i) = \bar{U}^i$$

where $\bar{U}^i$ is the level of utility obtainable elsewhere, G is the level of public goods, and Y^i is his endowment of "income."[1] Total land rents are

$$(2) \qquad R = \Sigma r^i T^i$$

where T^i is the quantity of land consumed by the ith individual. Implicit differentiation of (1) yields

$$(3) \qquad -\frac{\partial r^i}{\partial G} = \frac{\partial U^i/\partial G}{\partial U^i/\partial r^i} .$$

But by Roy's formula,

$$(4) \qquad T^i = -\frac{\partial U/\partial r^i}{\partial U/\partial Y}$$

Thus

$$(5) \qquad \frac{\partial r^i}{\partial G} = \frac{\partial U^i/\partial G}{\partial U^i/\partial Y} \frac{1}{T^i}$$

This specifies how much additional rent payments individuals are willing to make in response to an increase in the supply of a public good.

The community seeks to maximize net rents; i.e.,

$$\max \; R - G$$

---

1. Clearly, we could make the individual's income; e.g., his wage, also depend on the community in which he lives; it should be apparent that this will not alter the analysis.

where, for simplicity, we have assumed that the public good is produced at constant costs, and we have chosen our units so that one unit of the private good can be transformed into one unit of the public good.

Thus, differentiating $\Sigma r^i T^i - G$ with respect to G (holding utility constant), we obtain

$$(6) \qquad \sum_i r^i (\partial T^i/\partial G)\big|_U + \sum_i T^i (\partial r^i/\partial G)\big|_U - 1 = 0$$

In equilibrium the total demand for land must be equal to the total supply, which is fixed, i.e.,

$$(7) \qquad \sum_i T^i = \bar{T} \quad .$$

Hence, if in competitive equilibrium $r^i = r$ for all individuals (all individuals face the same prices), then

$$(8) \qquad \sum_i r^i (\partial T^i/\partial G)\big|_U = r \sum_i (\partial T^i/\partial G)\big|_U = 0 \quad .$$

Substituting (8) and (5) into (6), we obtain

$$(9) \qquad \sum_i \frac{\partial U^i/\partial G^i}{\partial U^i/\partial Y^i} = 1 \quad .$$

Note that (9) is the familiar Samuelson condition for determining the Pareto efficient supply of public goods: the sum of the marginal rates of substitution must be equal to the marginal rate of transformation (here unity).

We have been careful to assert that land value maximization leads, under the stipulated conditions, to an efficient level of supply of public goods; the equilibrium may still not be Pareto efficient, because the allocation of individuals among communities may be inefficient, as our analysis below will confirm.

There is, however, one set of further restrictions which ensure that the equilibrium is in fact Pareto efficient. Assume that there is an infinite number of identical islands, and assume that there is a very large number of identical individuals. Then[1] there is a Pareto efficient allocation in which in each community, public goods expenditure equals land rents, and all communities are of identical size.[2] This Pareto efficient allocation can be supported by a local public goods competitive equilibrium.

IV. Inefficient Local Public Goods Equilibrium

Our earlier analysis identified three important conditions for a local public goods equilibrium to be Pareto efficient: there must be the right number of communities; individuals must be allocated correctly among the communities; and within each community, there must be the right supply of public goods.

We shall now see why, under quite plausible conditions, the local public goods equilibrium may be inefficient in all three respects. There are (at least) five problems encountered in ensuring the efficiency of the local public goods equilibrium:

(a) There are often multiple Nash equilibria, some of which are Pareto inferior to others. These inefficiencies are of two types:

(i) A homogeneous population is distributed incorrectly among a set of communities; or

---

1. Provided there is sufficient "congestion" that it is desirable to have more than one community; see below.

2. This has been referred to as the Henry George Theorem. See Stiglitz (1977), Arnott and Stiglitz (1979) and Flatters, Henderson and Mieszkowski (1974).

(ii) There is a heterogeneous population, which is matched together into communities (or matched with different islands), in an inefficient manner.

(b) Pareto optimality requires subsidies from one island to another; it is not in the interests of any single community to offer these subsidies.

(c) Because of land capitalization, landowners in each community are more concerned with providing public goods which are attractive to those who are on the margin of moving into their community, than they are with the welfare of intra-marginal individuals in their community.

(d) Because of rental capitalization (the fact that rental rates reflect the level of community services offered) renters in each community are more concerned with providing public goods which are relatively unattractive to the marginal immigrant than they are with the direct benefits accruing to themselves.

(e) Attempts on the part of rich communities to avoid redistributions to poor migrants not only lead communities to engage in indirect (and often costly) exclusionary activities (which may, still, be consistent with constrained Pareto optimality), but result in a population distribution which may well not be a constrained Pareto optimum.

4.1 Homogeneous Population: Inefficiency in the Numbers of Communities and the Allocation of Individuals among Communities

There is a widespread feeling in many countries that the population of the central city is too large. The central city, because of its size, can provide many public goods, and it is these public goods which make it so attractive. It is not in the interests of any single individual to migrate to some provincial town; but if enough individuals migrated, it would be able to provide a high level of public goods. The reduction in the crowding in the central city would make such a change a Pareto improvement. A number of govern-

ments have, on the basis of some such argument, implemented policies to encourage greater decentralization. The central part of the argument is that the initial situation may, in fact, be a Nash equilibrium, but that there exists another equilibrium which is Pareto superior.

In Figure 5a we have drawn the maximized value of the utility of the representative consumer in a community as a function of the number of individuals within the community, which we denote by $V(\bar{N})$.[1] Very small communities can provide a very low level of welfare, because they cannot provide much of a supply of public goods; very large communities provide a low level of utility because of crowding (strict concavity of the production function). In the figure, we have depicted the total population $\bar{N}$ as exceeding N^* , the optimal population, but being less than $2N^*$. Pareto optimality requires that there be two communities. Yet, there is an equilibrium in which only one community is inhabited, provided $V(\bar{N}) > V(0)$. Figure 5b illustrates a case where there are multiple Nash equilibria, all except one of which are inefficient.

In Figure 5c we depict a situation where the population is equal to $2N^*$. There is still an equilibrium in which there is only one community.

4.2 Inefficient Matching Nash Equilibria

The problem here is similar to that in the preceding subsection: there are inefficient allocations of individuals among islands, but no single individual has any incentive to move. There are two islands, one with a long beach but no

---

1. If output, Q , is a function of the number of individuals in the community, $Q = F(N)$, and if output can be used as either public goods, G , or private goods,

$$V(N) \equiv \max U(c,G)$$
$$\text{s.t.} \quad cN + G = F(N)$$

where c is per capita consumption, and where $U(c,G)$ is the representative individual's utility of private and public goods.

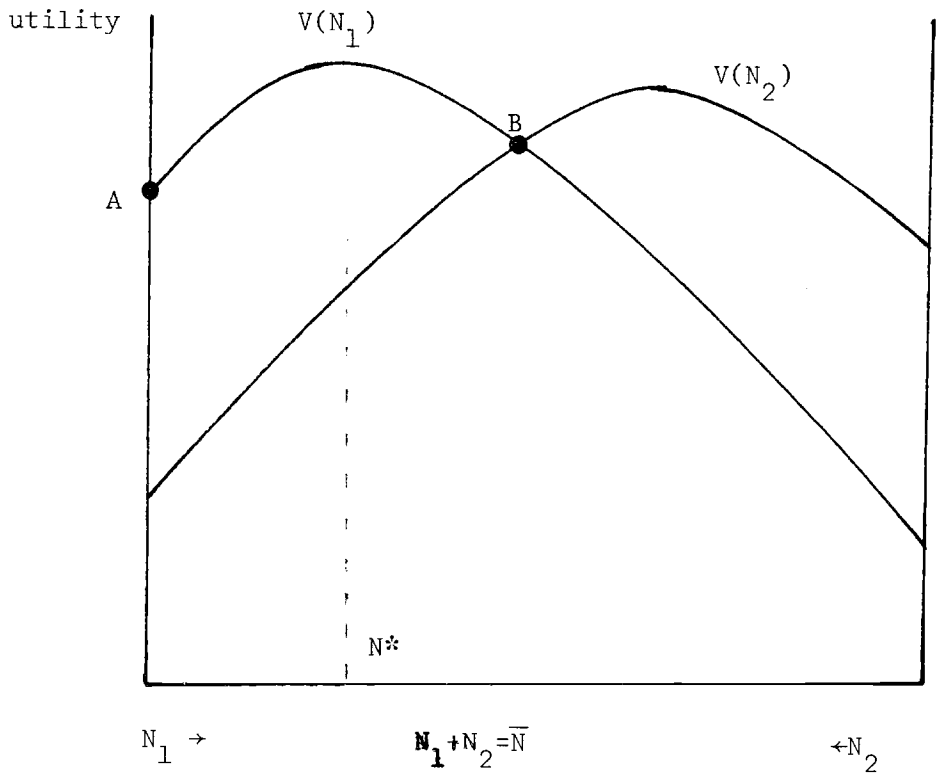

Figure 5a. Equilibrium at A (all population is in one island) is stable but Pareto inferior to equilibrium at B.

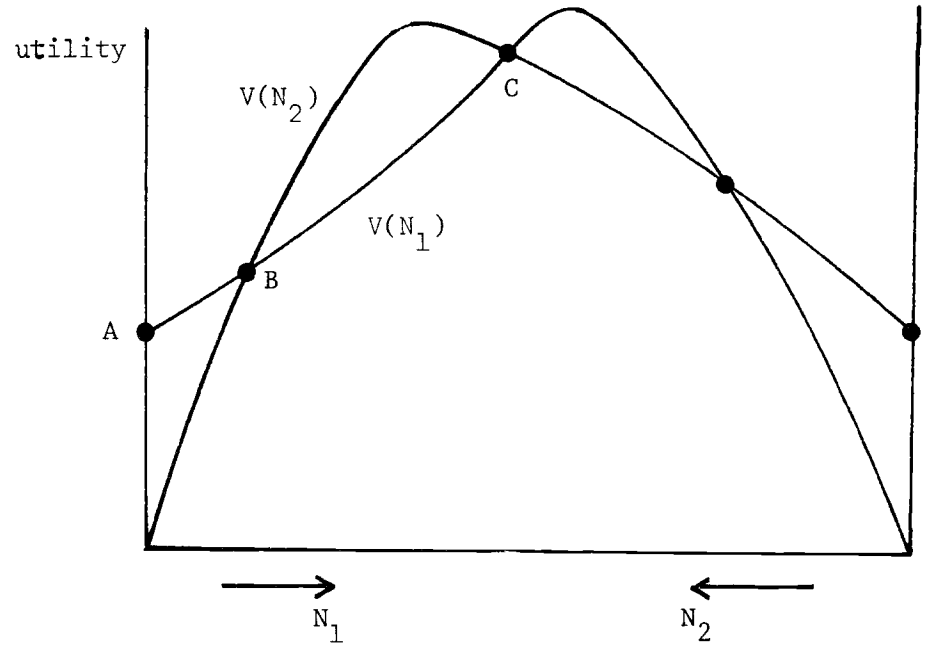

Figure 5b. Pareto superior equilibrium C is unstable; equilibrium B is stable.

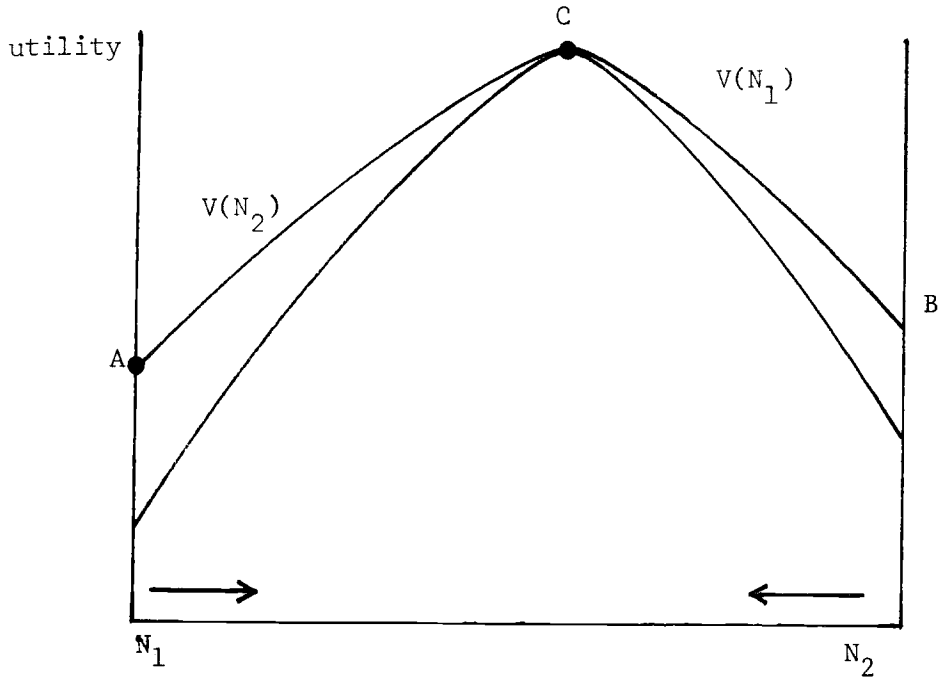

Figure 5c. Equilibria at A and B are both stable, C is unstable.

hills, the other with a beautiful hill for skiing but no beach. There are two types of individuals, skiers and swimmers. For the beach to be usable on the first island requires an expenditure of resources (e.g., constructing an access road); with a much greater expenditure of resources, a much less satisfactory beach could be constructed on the second island. Conversely, an artificial hill for skiing could be constructed on the first island; but on the second, only a minimal amount of expenditure is required for the development of a ski resort. If, by chance, the skiers happened to settle on the first island, the swimmers on the second, then there could be an inefficient Nash equilibrium. Given that the ski resort has not been developed on the second island, the skiers prefer their artificial hill; and given that the beach has not been developed on the first island, the swimmers prefer their little scrawny beach. And given the set of individuals who live within each island, the allocation of resources among public and private goods is efficient.

More complicated versions of this matching problem in the version of the model without land can easily be constructed.[1]

---

1. There are two types of labor, doctors and lawyers; there are four possible types of public goods, A, B, C, D. There are two types of doctors, with utility functions

$$U^{\alpha} = u(c) + G_A + \lambda G_B$$

$$U^{\beta} = u(c) + G_C + \lambda G_D \ .$$

Similarly, there are two types of lawyers, with

$$U^{\alpha} = u(c) + G_A + \lambda G_D$$

$$U^{\beta} = u(c) + G_C + \lambda G_B \ .$$

If all communities mix type α lawyers with type α doctors, and type β lawyers with type β doctors, then there is an equilibrium in which A is produced in the first community, C in the second. But there is another equilibrium in which type α doctors are mixed with type β lawyers, and good B is produced, and type α lawyers are mixed with type β doctors and good D is produced. If $\lambda < 1$, this equilibrium will be Pareto inferior to the former equilibrium.

4.3 The Pareto Optimal Allocation with Free Migration May Require Subsidies

If there is a limited supply of "good" islands, and migration cannot be restricted, then individuals from the "poor" islands will migrate to the "good" islands until utilities are equalized. This may not be efficient. To see this most vividly, assume there are two types of islands, large islands and small islands. All individuals are identical, and are treated identically. Then the level of utility on any particular island can be expressed as a function of the number of individuals living on that island (assuming that the level of public goods within the island is optimally chosen). The larger island has a larger maximal level of utility. Now assume that, although there is a very large number of such islands, there are too few to accommodate the entire population, if each island is optimally populated. The equal utility equilibrium will require more than the optimal population in the larger island. But note that if the larger island subsidizes the smaller island, the utility level attained at each population size in the representative small island is increased, and in the representative good island it is lowered, but as Figure 6 makes clear, the equilibrium level of utility on both islands may be raised: everybody may be better off as a result of the subsidy. If there are only two islands (which stretches the plausibility of some of the other assumptions in the analysis), then it makes sense for the rich (larger) island to subsidize the poor (smaller), but in the general case, where there are many rich (large) islands, any single island is likely to believe it will have a negligible effect on the supply of potential migrants.

The misallocation of individuals resulting from differences in endowments of different communities is a problem of some practical importance. If Alberta decides to use its oil revenues to supply public goods, then it may attract

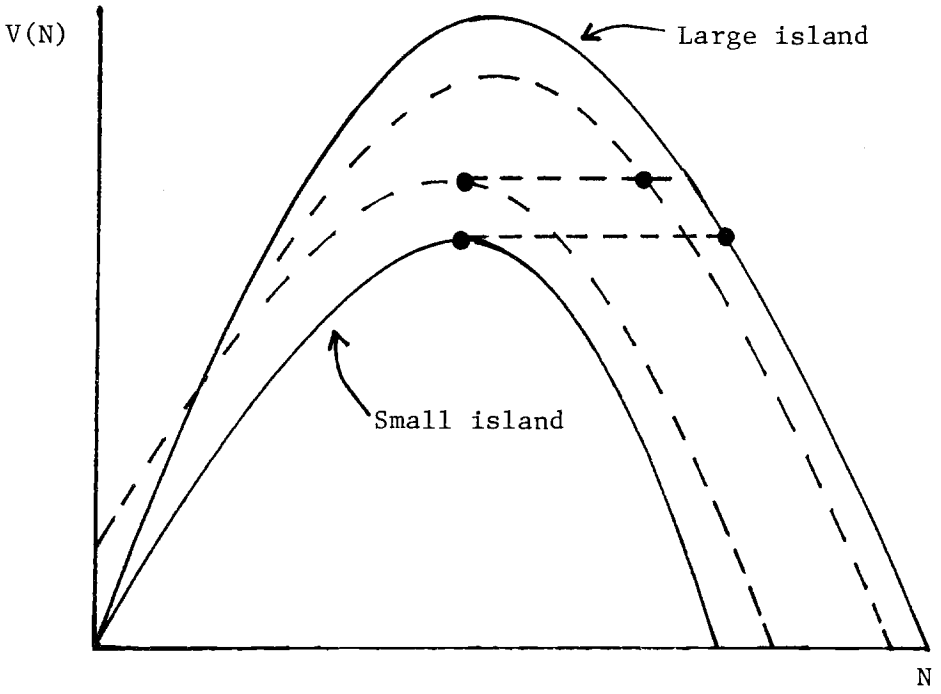

Figure 6. If the large (rich) island subsidizes the small (poor) island, everyone's welfare may be increased.

migration, beyond the efficient level. Some of the potential consumer surplus may be appropriated by owners of land in Alberta in the form of higher land rents; nonetheless, there is no presumption that the equilibrium level of migration will be efficient. Indeed, the major effect of the higher land rents may be to make Alberta more attractive to those who have a low preference for consuming land, which need not be in accord with the Pareto efficient allocation of labor. Alberta could, of course, effectively discriminate between current inhabitants and future migrants, by distributing ownership claims in the oil to current inhabitants. This would eliminate the source of the inefficiency. Individuals would no longer have an incentive to migrate to Alberta to capture a share of the "public" rents associated with the oil.

4.4 Community Developers

The problems discussed in Sections 4.1-4.2 can be alleviated by introducing town entrepreneurs (community developers). Although there may well not be an equilibrium with community developers (the core of the economy may be empty) it is clear that when the economy is at an inefficient Nash equilibrium there is scope for a community developer to enter, reorganize the allocation of labor, and appropriate for himself the surplus that is thereby generated. The critical question, however, is whether the developer will be able to appropriate a sufficiently large fraction of the surplus to compensate him. In the non-land based version of the model, a developer might propose to the members of two (or more communities) a rearrangement that would make all of them better off. Once they perceive this rearrangement, the developer's services may no longer be needed; the citizens within the communities simply appropriate the increased returns for themselves.

This is, of course, a standard problem: the public good is a public good. It may be very difficult for any individual to appropriate the returns from pursuing the public good. Moses led his people to the promised land, but was unable to enjoy any of the fruits of his public service; and the problem which beset Moses has beset others who have labored in the public service.

In certain situations, public good problems can be resolved, or at least alleviated, by establishing the appropriate property rights. In the case of what we have referred to as the "land based communities," the landowners as a group may benefit from improving the efficiency with which public services are provided and from providing public goods which are more in accord with the preferences of the inhabitants. Even then, however, each landowner has an incentive to "free ride" on the efforts put forth by other landowners. In the next section, we show that maximizing land values will not, in general, lead to Pareto efficient equilibria. Nonetheless, there are important incentives for landowners to make sure that public goods are efficiently provided. In contrast, we show, in the following section, that not only do renters not have any incentives for ensuring that public goods be efficiently provided, but they may have perverse incentives, to ensure that the kinds of public goods that are provided are unattractive to those who might be considering immigrating into the community.

V. Land Capitalization

One of the important implications of free migration is that if there are differences in communities, in public goods, amenities, or taxes, these differences should get reflected ("capitalized") back in the value of land. This in turn has important implications for the supply of public goods: individuals in a community are concerned not only with the direct consumption benefits

associated with any expenditure-tax program, but also with the effects of the program on land values. Thus, an individual in a community with good schools who has no children may still be concerned that the schools in his community maintain their quality, lest property values decline.

Two questions then arise:

(1) What implications does this have for the kinds of public goods-taxes each individual within a community votes for?

(2) What implications does this, in turn, have for the local public goods equilibrium?

The questions here have a clear parallel to those asked in the theory of the firm: under what conditions will shareholders wish the firm to maximize their market value? What implications does firm market value maximization have for the efficiency of market equilibrium?

In traditional competitive theory, when there is a complete set of markets, and each shareholder in each firm takes the prices of all goods as given, then all shareholders will wish all firms to maximize their stock market value, and in doing so, they will ensure the efficiency of the economy. When there is not a complete set of markets, as in the traditional monopolistically competitive model, the prices faced by any (even small) firm may alter as it changes, for instance, its production decisions. In that case, it can be shown that the shareholders may not wish the firm to maximize the stock market value, there will not be unanimity among the shareholders about what the firm should do, and even if the firm were to maximize the stock market value, the market allocation would not in general be Pareto efficient. (See, for instance, Stiglitz (1969, 1972), Grossman and Stiglitz (1977).)

Exactly parallel results obtain here. In our discussion of Section III, we considered the case where there is a sufficiently large number of communities

that each community takes the level of utility of each type of individual as given. If the owners of the land can choose to live in other communities, and still obtain the rents on their land, it is clear that, since their opportunity set is unambiguously increased by having their land rents maximized, they will wish to choose the level of public goods in such a way as to maximize net rents; and our earlier analysis established in that situation that the level of public goods will, in fact, be Pareto efficient.

But if individuals lose their rights to obtain rents when they emigrate, then clearly individuals will be concerned not only with land rents, but with the supply of public goods provided within their community. They will not wish the community to maximize net land rents.

More generally, if there are sufficiently few communities that there are some infra-marginal individuals (i.e., some individuals who would not migrate were taxes raised slightly or the level of public goods decreased slightly), then there will not be unanimity among the citizens on what policy the government should pursue; not everyone will wish the community to maximize land rents. Moreover, maximizing land rents will not, in general, be Pareto efficient.

What is critical to the determination of land values is the valuation of the marginal person not living in the community. Communities increase their land values by making themselves more attractive to those not presently living in them. Thus, if there is a large number of communities with populations identical in characteristics to the given community, then the marginal migrants are identical to the present inhabitants. Making the community more attractive to these marginal migrants improves the welfare of the current inhabitants.

When, however, every community differs slightly from every other one, then the marginal migrant is distinctly different from the current inhabitants. This has an important effect on those planning to sell their land. Thus an

"older voter" more concerned with the value of his land will vote for a public goods package which is more attractive to younger potential migrants who are on the margin of entering. As a result, the equilibrium will reflect more the preference of the median individual within the society than the median individual within the community. Not surprisingly, then, the equilibrium which emerges is not in general Pareto optimal.[1,2] (See Stiglitz (1974), Atkinson-Stiglitz (1980).)

It should be noted that the change in land rents does not, in general, provide an accurate estimate of the benefits accruing, for instance, from an improved transportation network, a more efficient public administration, or a better allocation of public goods. (See Arnott-Stiglitz (1980).) Assume, for instance, that some community discovered a way of producing community services at lower cost; it could then provide the same public goods services with lower taxes. This would induce those not living in the community to move in; in

---

1. Even when individuals differ only by age, and not by tastes, the market equilibrium may not be Pareto optimal. Assume, for instance, that there were two techniques for producing a public good, one using current resources, the other using capital resources. Assume that only the young benefit directly from the public good (schools); the old only benefit indirectly from the effect on market values. Assume, moreover, that we cannot differentiate taxes on the basis of age, and that mobility costs are sufficiently high that all communities are mixtures of the young and the old. The old will then always prefer the capital resource method of producing the public good since that is the only way that they can appropriate the returns. This will be so even if it is the less efficient way of producing the public good.

2. We have focused on changes within a single community. Should property owners support a national program which increases the supply of public goods that could be obtained from a fixed rate of property taxes? Such a change would increase or decrease property values depending on whether the increased effective supply of public goods increases or decreases the demand for land. The effect of changes in land rents when all communities change, say, their level of public goods are thus markedly different from the changes which occur when only one community alters its behavior.

migration continues to the point where land values rise to the point where the marginal migrant is indifferent to staying in his original community. Thus, if land values increased by an amount equal to the present discounted value of the tax savings, and plot sizes were fixed, equilibrium would be restored. But if plot sizes were variable, the higher value of land would induce individuals to purchase smaller plot sizes; thus, for any finite tax reduction, the equilibrating increase in land values exceeds the present discounted value of the tax reduction.

The analysis so far has assumed that all land within the community is homogeneous. In fact, of course, different parcels of land are quite different, and what is in the interests of one landowner may not be in the interests of another. For instance, after a set of apartments is constructed near the urban center, it is in the interests of those apartment owners to pass a zoning law, restricting further construction of apartments. Such a restriction increases the wealth of those who presently own land on which apartments have already been constructed, at the same time that it decreases the wealth of those who presently own land on which apartments would have been constructed in the absence of the zoning restrictions. One group of landowners have, in effect, managed to confiscate part of the wealth of another group of landowners. The incentives for them attempting to do so are clear, in spite of the fact that there may be significant dead weight losses as a result. (Direct confiscation, a more efficient way of transferring resources from one group to another, may not be allowed by the political process.)

Similarly, renters have an interest in attempting to confiscate the wealth of the owners of land (and buildings). The means by which they do this, and the consequences for the nature of the local public goods equilibrium, are the subject of the next section.

VI. Rental Capitalization

The benefits of public goods are reflected not only in land values, but also in rents. Since in certain large cities, renters comprise a majority of the population, it is important to understand how various public goods-tax programs affect their welfare.

Consider, first, public goods programs financed by land taxes. (The other cases follow along similar lines.) What renters are concerned with in deciding to migrate is the wage they receive (after tax), the level of public goods and the level of rents. Thus the level of land taxation is in itself of no interest. An improvement in the efficiency with which public services are provided (keeping the level of public services unchanged) leaves renters completely unaffected. Thus, they will have no concern for the efficiency of public services. Moreover, an improvement in the quality of public services will be immediately reflected in the rentals they have to pay, provided there is an infinite number of potential immigrants identical to themselves. On the other hand, if there is not, the sole concern of the renter in evaluating any program is whether it raises rents by less than it improves his welfare (lowers rents by more than it decreases his welfare). Thus, a renter who has a less than average aversion to garbage in city streets will vote for a small expenditure on garbage collection; although he would like more garbage collection, he realizes that any increase will be more than offset by rent increases. Indeed, he may even vote for something he dislikes, knowing that others dislike it even more.

Thus, renters have no incentive to ensure that public services are provided efficiently, and have perverse incentives with regard to the choice of quality and quantity of public goods.

VII. Redistribution

One of the most noted aspects of community formation in the United States is the important role that income-wealth differences play. This is not surprising: individuals with different incomes are likely to have different attitudes towards public and private goods. There are, however, two important implications of free migration related to wealth differences.

First, we noted in our basic result on the optimality of the local public goods equilibrium that there was effectively no scope for redistribution. Any attempt by a community to redistribute income away from some group would simply induce migration. Although the assumptions of that model are extreme, it is clear that the power to redistribute income locally with free migration is severely limited.

Secondly, in situations where in-migration cannot be restricted, and discriminatory taxes against the poor cannot be imposed, then there may be some incentive for the poor to migrate into the rich communities. In the case of pure public goods, this may be of little concern: there is no extra cost associated with the poor being (relatively) free riders on the rich provided that the political structure does not lead to an allocation of resources to the public good which is different from that which the rich would have chosen by themselves, and provided there are no congestion effects. If there are, then the rich may still wish to exclude the poor.

In the case of publicly provided private goods -- like education -- there is a real cost to the rich of having more poor individuals within their community. They will thus attempt to exclude them. There are a variety of exclusion devices; e.g., requiring large minimum size lots, having a very high tax rate (so the poor cannot "afford" to live in the community); or having a

very low tax rate with a very low level of public services (both the rich and poor substitute private for public goods, but the poor can do this less well). Although such exclusionary devices clearly create "distortions" relative to the first best optimum, where poor individuals could be directly excluded or discriminatory taxation could be imposed, the existence of these exclusionary practices does not imply that the local public goods equilibrium is not a constrained Pareto optimum, taking into account the restrictions which are, in fact, imposed on the set of instruments which the communities can employ to discriminate. Moreover, further restrictions on the set of exclusion devices (e.g., not allowing certain zoning requirements) may simply lead to the substitution of less efficient and desirable exclusionary devices. Such restrictions may lead to a Pareto inferior equilibrium.

VIII. The Decentralizability of Pareto Efficient Allocations

The previous sections established that, while there were some extremely restrictive conditions under which a local public goods competitive equilibrium might be Pareto efficient, there was a strong presumption that it was not. This established that the first of the two fundamental theorems of welfare economics did not extend to economies in which there were local public goods. We now consider the second theorem: can every Pareto efficient allocation be decentralized? We show that, in general, not every Pareto efficient allocation can be decentralized. Since many of the arguments employed to show this are straightforward modifications of the arguments we presented earlier, showing that the market allocation was inefficient, our discussion will be very brief.

There are four problems with the decentralizability of the set of Pareto optimal allocations with free migration.

1. There may only be a single community. The fact that with pure public goods the marginal cost of an additional individual enjoying the public good is zero leads to a strong presumption that there be a single community. There are two grounds for forming separate communities.

(a) The public good is not a pure public good; there is congestion in its use. (At the extreme, it may be a publicly provided private good, for which the marginal cost of usage is equal to the average cost.) Most of the public goods which are presently provided by local communities fall within this category; education, sewage, garbage collection, etc. And this is the category of goods which Tiebout seems to have had in mind. Yet, these are not the pure public goods which Samuelson described in his 1954 paper, and thus Tiebout's analysis does not provide the resolution of the public goods problems posed there.

(b) There are diminishing returns in private goods in the formation of larger communities. This may be either because of diminishing returns to production (as in the "island" model described above); or because of increased transport costs as communities in which the public good is provided centrally become larger.

Even when there are diminishing returns, it may not be desirable to form separate communities. There must be sufficiently rapidly diminishing returns.

Consider a simple economy in which the output of goods is a function of the number of individuals living in the community. For simplicity, assume all individuals are treated the same. Assume, as before, that a unit of output can be used to produce either a unit of the private good or a unit of the public good.

Thus, for a fixed population, the production possibilities schedule appears as in Figure 7. If we increase the population, we can increase the supply of public goods, but decrease the per capita supply of private goods. Thus, the production possibilities schedule, the outer envelope of these linear schedules

is convex, as in Figure 7. Whether it is desirable to have a finite or infinite number of people in the community depends on the utility function for public and private goods. (Cf. Figures 7a and 7b.)

These non-convexities have one further important implication. Even when it is desirable to have more than one community, it is quite likely that there may not be a sufficiently large number of communities that the utility taking analogue to the perfect competition model presented in Section III is appropriate. Rather, the appropriate model is likely to be more akin to a monopolistically competitive model, as discussed in Sections IV-VI.

2. The public good must be localized. Obviously, if the level of public goods provided in one community affects the level of welfare of citizens in another, we cannot decentralize the provision of public goods. Each community will undersupply public goods. Again, many of the most important public goods cannot be localized: the benefits of R&D, much of the programming for TV, etc., are all "national public goods." This further limits the scope of the Tiebout model for providing a resolution to the problems associated with the provision of public goods.

3. The Pareto optimal allocation cannot entail subsidies from the citizens of one community to those of another. The conventional statement of the second welfare theorem asserts that every Pareto optimal allocation can be sustained by a competitive economy with the appropriate lump sum redistribution. Thus, in the present context, the parallel theorem requires that any redistributions not be contingent upon the individual's choice of location.

We established earlier that, in the land based model, Pareto optimal allocations (with free migration) will require inter-island transfers, unless

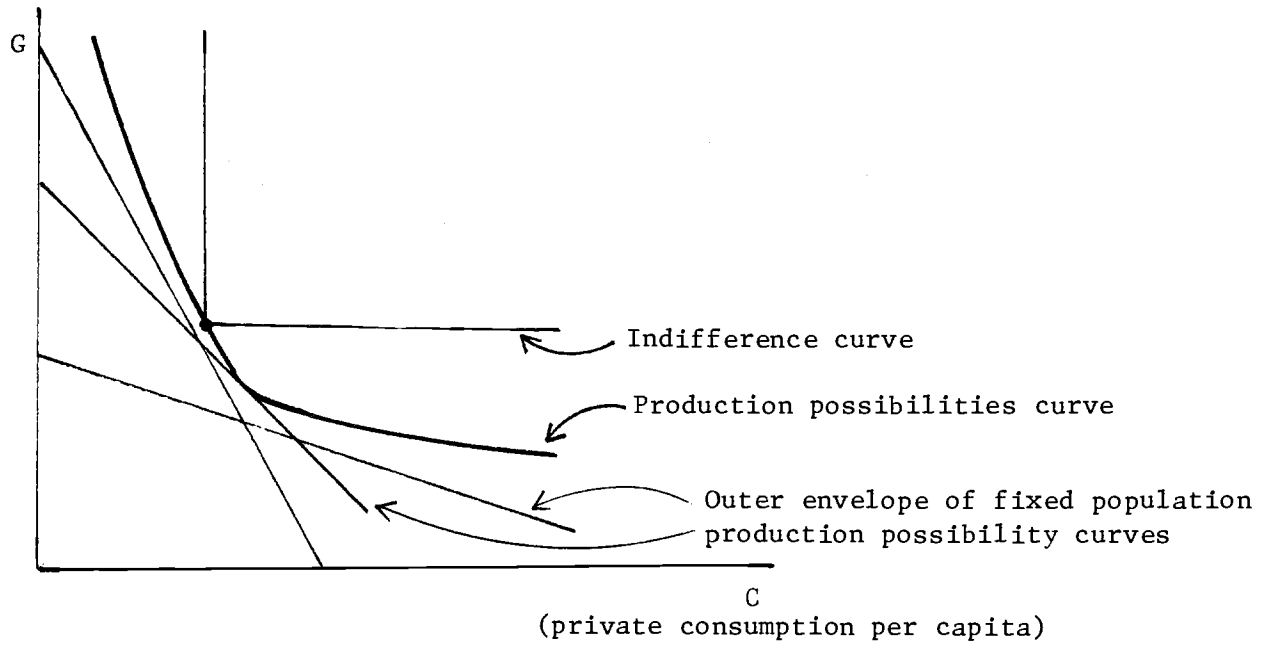

Figure 7a. Optimal to have finite number of communities.

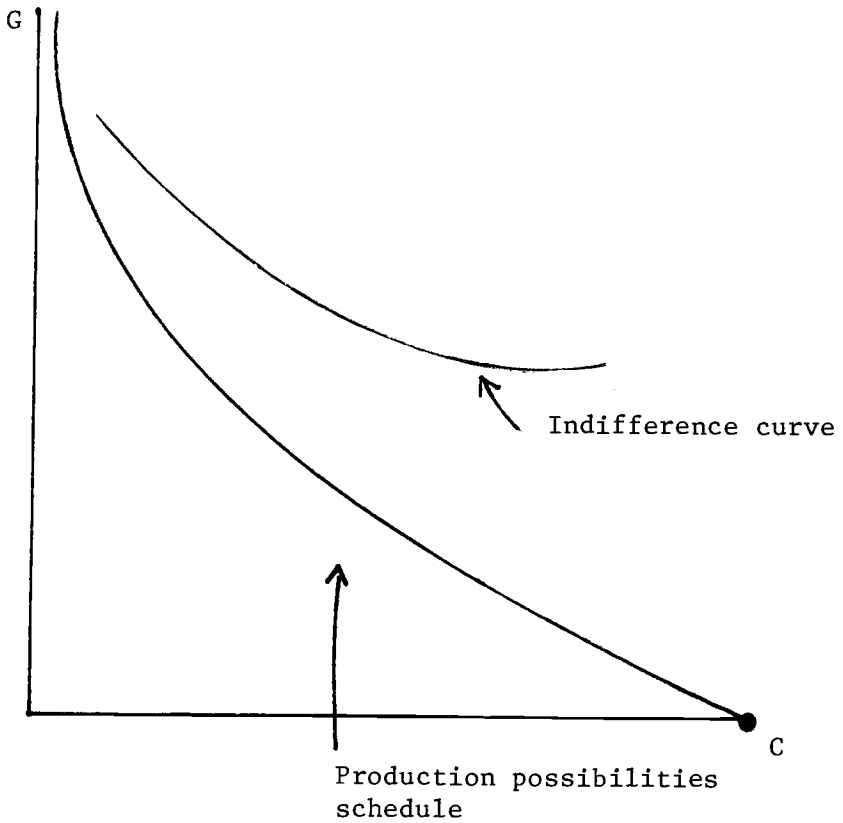

Figure 7b. Optimal to have one community.

all islands are identical. Lump sum taxes and subsidies (which are not dependent on the individual's location) are not sufficient.[1]

4. If the number of individuals is not an exact multiple of the optimal size of a community, then if there is community entrepreneurship, the Pareto optimal allocation may not be supported by a decentralized equilibrium. A community entrepreneur is someone who organizes a new community, with a new set of rules for the determination of the level of consumption of private goods as a function of the endowments of factors he brings to the community. Consider, for instance, the land based model introduced earlier. Then in Figure 5a the Pareto optimal equal utilities equilibrium entails both communities being below the optimal size. A community entrepreneur could then propose forming a new community of the optimal size; he could appropriate as rents a sufficient amount to make individuals indifferent to migrating. Though this itself would not be an equilibrium, if there is a competitive supply of entrepreneurs, this does establish that the Pareto optimal allocation cannot itself be sustained.

IX. Conclusion

In this paper, I have argued that the Fundamental Theorems of Welfare Economics do not extend to economies with local public goods: the conditions required to ensure that every Pareto optimum can be generated by a competitive local public goods equilibrium (with the appropriate lump sum redistributions),

---

1. In this situation, a form of "regionalization" may be possible; that is, a collection of islands, large and small, in the appropriate proportion, can enjoy fiscal autonomy from all other islands. This region is just a miniaturization of the economy as a whole. Under more general circumstances, where all islands differ, then even the partial decentralization associated with regionalization may not support the Pareto optimal allocation.

and those required to ensure that the competitive local public goods equilibrium be Pareto optimal are indeed stringent.[1]

At a theoretical level, this should not be surprising: the presence of local public goods introduces a non-convexity, and non-convexities are often troublesome for competitive theory: (1) competitive equilibrium may not exist; (2) non-convexities in practice are likely to be associated with various kinds of imperfectly (monopolistically) competitive behavior; and (3) where there are non-convexities, it is not necessarily the case that every Pareto-efficient allocation can be supported by a competitive equilibrium with appropriate lump sum redistributions.

Perhaps more significantly, while the conditions under which the efficiency of the local public goods equilibrium can be established are far more general than those conventionally assumed (admitting, for instance, heterogeneity both in skills and tastes), some of the instances of "market failure" we have observed correspond to important policy issues: we have noted, for instance, the possibility of equilibria with excessive concentration of population, and pointed out that, while there are instances where land developers might lead to welfare improvements there are other instances where market value maximization does not lead to Pareto optimal allocation of resources.

More disturbingly, we have noted the absence of appropriate incentives on the part of renters for voting for efficient tax-public goods packages. (Land-

---

1. Throughout this paper, I have assumed perfect information on the part of consumers about the packages of goods offered by different communities. Recent work in competitive equilibrium theory has shown how critical the perfect information assumption is to the optimality results that have been obtained. The assumption of perfect information about public goods (e.g., schools) of potential migrants seems particularly questionable. (See Hannaway and Garner (1982)).

owners benefit, of course, from better tax-public goods programs; but there, the free rider problem implies that it is not in the interests of any single individual to ensure that the public good is done.)[1]

The inefficiencies we have noted in the competitive local public goods equilibrium provides some arguments for the role of regional and national authorities in the provision of local public goods and in redistribution across communities.

(The design of optimal interventions is a question I hope to pursue on another occasion.)

Still, I believe that this discussion vastly underestimates the virtues of a decentralized mechanism for providing public goods.[2] Local communities can respond to local variability more effectively than centralized control (although it is a moot question whether centralized control at the state level is more responsive to local needs than centralized control at the national level). The opportunities for political participation and choice (voice and exit) provided by local communities are of value themselves in a democratic society. Even if voters have limited incentives for ensuring that the public

---

1. In the private market, when a firm is inefficiently run, there may be an incentive for a takeover. Although it is conceivable that a community organizer would buy all the land in a community, change the management, and make a profit, in practice this does not occur.

   Even for the private firms, the efficacy of the takeover mechanisms has been questioned. A shareholder, believing that the firm is about to be taken over and a more efficient management installed, might well refuse to sell his shares, prefering to realize the capital gain himself.

2. Just as I have argued that the conventional competitive paradigm does not accurately reflect the virtues (and vices) or the market. (Stiglitz (forthcoming c).)

good is pursued, local administrators have incentives for demonstrating innovativeness and efficiency. (Their incentives are still only loosely related to the preferences of their constituents; but similar arguments apply to firm managers.)

The opportunities for extending the scope of choice and competition within the public sector have not yet been fully exploited. The question before us is, recognizing that such competition does not necessarily lead to efficient resource allocations, how can competition and choice be introduced to best serve the public interest.

REFERENCES

Arnott, R. J. and J. E. Stiglitz, "Aggregate Land Rents, Expenditure on Public Goods and Optimal City Size," Quarterly Journal of Economics Vol. 63 (November 1979), pp. 471-500.

Atkinson, A. B. and J. E. Stiglitz, Lectures in Public Economics (New York and London: McGraw-Hill Publishing Company, 1980).

Berglas, E., "Distribution of Tastes and Skills and the Provision of Local Public Goods," Journal of Public Economics Vol. 6, No. 4 (1976), pp. 409-423.

Buchanan, J. and Goetz, "Efficient Limits of Fiscal Mobility," Journal of Public Economics (April 1972), pp. 25-43.

Dixit, A. K. and J. E. Stiglitz, "Monopolistic and Optimum Product Diversity," American Economic Review 67 (1977), pp. 297-308.

Flatters, F., V. Henderson, and P. Mieszkowski, "Public Goods, Efficiency, and Regional Fiscal Equalization," Journal of Public Economics III, No. 2 (May 1974), pp. 99-112.

Grossman, S. and J. E. Stiglitz, "Stockholder Unanimity in the Making of Production and Financial Decisions," Quarterly Journal of Economics Vol. 94, No. 3 (May 1980), pp. 543-566.

Groves, T. and J. Ledyard, "Optimal Allocation of Public Goods: A Solution to the 'Free-Rider' Problem," Econometrica Vol. 45 (1977), pp. 783-809.

Hannaway, J. and W. Garner, "Private Schools: The Client Connection," in Family Choice in Schooling, Michael E. Manley-Kasimir (ed.), (Lexington Books, 1982).

Kramer, G., "On A Class of Equilibrium Conditions for Majority Rule," Econometrica 41 (1973), pp. 285-297.

Lancaster, K. J., "Socially Optimal Product Differentiation," American Economic Review 65 (1975), pp. 567-585.

Pestieau, Pierre, "Fiscal Mobility and Local Public Goods. A Survey of the Empirical and Theoretical Studies of the Tiebout Model," Spatial Analysis and Public Services Policy, Program Paper 6, May 1980.

Salop, S. C., "Monopolistic Competition With Outside Goods," Bell Journal of Economics 10 (1979), pp. 141-156.

Samuelson, P. A., "The Pure Theory of Public Expenditure," Review of Economics and Statistics (1954), pp. 387-389.

Slutsky, S. M., "A Voting Model for the Allocation of Public Goods: Existence of an Equilibrium," Journal of Economic Theory (1977), pp. 299-325.

Spence, A. M., "Product Selection, Fixed Costs and Monopolistic Competition," Review of Economic Studies 43 (1976), pp. 217-235.

Stiglitz, J. E., "Demand for Education in Public and Private School Systems," Journal of Public Economics Vol. 3 (November 1974), pp. 349-386.

Stiglitz, J. E., "Incentives and Risk Sharing in Sharecropping," Review of Economic Studies Vol. 41 (April 1974), pp. 219-255.

Stiglitz, J. E., "Incentives, Risk, and Information: Notes Towards A Theory of Hierarchy," Bell Journal of Economics and Management Science Vol. 6, No. 2 (Autumn 1975), pp. 552-579. (Presented at Berlin Symposium on Planning, August 1973.)

Stiglitz, J. E., "Information and Competition," Oxford Economic Papers (forthcoming).

Stiglitz, J. E., "On the Optimality of the Stock Market Allocation of Investment," Quarterly Journal of Economics Vol. 86, No. 1 (February 1972), pp. 25-60. (Abbreviated version of paper presented to the Far Eastern Meetings of the Econometric Society, June 1970, Tokyo, Japan.)

Stiglitz, J. E., "Public Goods in Open Economies with Heterogeneous Individuals," NBER Working Paper No. 694, Journal of Public Economics (forthcoming).

Stiglitz, J. E., "The Theory of Local Public Goods," The Economics of Public Services, M. S. Feldstein and R. P. Inman (eds.), (London: Macmillan Press, 1977).

Stiglitz, J. E., "Utilitarianism and Horizontal Equity: The Case for Random Taxation," IMSSS Technical Report No. 214, Journal of Public Economics (forthcoming).

Stiglitz, J. E., "Variety, Equity, and Efficiency and the Theory of Monopolistic Competition," Journal of Political Economy (forthcoming).

Tiebout, C. M., "Pure Theory of Local Expenditures," Journal of Political Economy Vol. 64 (1956), pp. 416-424.

Vickrey, W., "The City as a Firm," in The Economics of Public Services, M. S. Feldstein and R. P. Inman (eds.), (London: Macmillan Press, 1977).