

THE POLITICS AND ECONOMICS OF DECENTRALIZATION

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## The Politics and Economics of Decentralization

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Local governments have failed to cope successfully with the urban crisis. In many cases their actions seem to have exacerbated the very problems they should be trying to solve. However, despite rather widespread agreement that existing governmental institutions could be greatly improved, there is no consensus on the reforms that should be made. Some observers advocate further decentralization while others suggest that the present fragmented system be replaced by a single metropolitan government. Although conflict over values is partly responsible, much of this disagreement over policy reflects instead our clouded vision of what local government is supposed to do. Nowhere is there available a coherent theory of the proper role of local government in an urbanized society.

It is possible, of course, that economics simply has little to contribute to the debate on the optimal structure of local government. In one of the finest books written on this subject, the political scientist Robert Wood argued that metropolitan government is justified solely on the grounds that it will produce "a better brand of politics." He explicitly eschewed an economic defense of metropolitan government as irrelevant, both empirically and conceptually. His approach has much more merit than economists would probably care to admit.

While the application of economic analysis to the study of political processes needs careful qualification, economists have made some significant

contributions to clarifying the relative benefits of decentralizing or consolidating political jurisdictions. The case for decentralization is perhaps the more straightforward. If consumers are able to choose among a wide variety of alternative jurisdictions, then as Charles Tiebout observed, they will reveal more about the nature of their preferences than in the case of a pure public good. Decentralization permits consumers with similar tastes and endowments to cluster into relatively homogeneous jurisdictions where public services can be more closely tailored to individual preferences. The optimal degree of decentralization will represent a balance between the benefits of jurisdictional consensus and the economies of shared consumption. In a recent elaboration of this theme, Martin McGuire suggests that this process of "voting with one's feet" will become fully equivalent to a competitive equilibrium provided that it is possible for consumers to sort themselves into completely homogeneous jurisdictions of "efficient" size (i.e., in which the economies of shared consumption are completely exhausted). Consensus within jurisdictions will then be, by definition, complete.

The case for consolidating rather than decentralizing existing jurisdictions is no less compelling. The argument is essentially that decentralization will reinforce the suboptimal behavior which we associate with fragmentation. In one of the clearest statements of this position, Jerome Rothenberg argues that jurisdictions which are too small will fail to internalize interjurisdictional externalities ("spillovers") and to accomplish a socially desirable amount of income redistribution. Although Rothenberg is not very specific on this score, one gathers the impression that accounting for these spillover and income redistribution effects could justify abandoning

the present fragmented system in favor of a single metropolitan government.

While its intellectual appeal is undeniable, the analysis of Tiebout and McGuire does not appear to square with the facts. There seems little doubt that households "vote with their feet" and that local political jurisdictions tend to stratify by taste and income class. However, most central cities seem to have expanded in size far beyond the point at which economies of shared consumption are exhausted. Subdivision of existing political jurisdictions is, nevertheless, quite rare. Stratification of jurisdictions has occurred, not through decentralization of the central city, but by the migration of high income households to the suburbs. Once in the suburbs, the wealthy exhibit a fondness for exclusionary zoning and a reluctance to espouse open housing legislation which would be superfluous in an equilibrium sustained by a competitive price system.

Although Rothenberg's models provide a reasonably accurate description of how fragmented local governments actually behave, his analysis does not explain why voters have so rarely shown a willingness to experiment with metropolitan government. If fragmentation is inefficient, as his analysis suggests, then this reluctance is not easily accounted for. Furthermore, a literal reading of Rothenberg's paper leads one to the conclusion that, if welfare support were shifted to the federal level and interjurisdictional spillovers internalized through an appropriate set of taxes and subsidies, then a decentralized system of local government along the lines of Tiebout and McGuire would be optimal.

While economic analysis has provided some useful insights into the problem, the optimal structure of local government remains a perplexing issue.

It is possible that the question is simply too complex to be handled under the present state of the art. I suggest, however, that we do have the necessary ingredients for constructing a coherent theory of local government yielding realistic implications. But construction of that theory requires a rigorous formulation of the problem in general equilibrium terms.

Section I of this paper develops a framework for analyzing the allocation of local public goods within a general equilibrium context, drawing heavily upon the analysis presented in Ellickson (1972). I begin by defining the concept of a jurisdiction and the production possibilities open to each jurisdiction in producing public goods. Two equilibrium concepts are then introduced, one treating the assignment of consumers to jurisdictions as predetermined and the other making the assignment endogenous to the analysis. Although it is the latter equilibrium concept that is relevant to the issue of an optimal system of jurisdictions, standard existence proofs apply only to the former concept. Thus, the possibility arises that a price system sustaining an optimal assignment may fail to exist. A simple three-person example is presented which illustrates this possibility.

While the existence of a market for local public goods is thus open to doubt, a price system of this sort may exist under some circumstances. In particular, by adding a fourth consumer to our three-person example, we satisfy the assumption of McGuire that consumers be able to stratify into completely homogeneous jurisdictions of efficient size. In this case a price system does exist which sustains an endogenously determined assignment of consumers to jurisdictions.

Our four-person example provides the focus for the rest of this paper.

In Section II we find that this example yields implications quite in accord with reality. Less wealthy consumers may vote against subdivision of a heterogeneous jurisdiction even though decentralization would lead to a more efficient allocation of resources. If stratification of jurisdictions occurs without compensation, then the poor will be worse off in "real" terms. The analysis provides a rationale for revenue sharing with redistribution from rich to poor jurisdictions. Finally, an explanation for why wealthy jurisdictions may resort to exclusionary zoning emerges quite naturally from this example. In the concluding section, I will discuss some of the more general implications of this analysis concerning the optimal degree of decentralization of local government.

#### I The Market for Local Public Goods

Consider an economy with one type of public good,  $m$  types of private good and  $n$  consumers. Let  $N = \{1, \dots, n\}$  denote the index set of consumers in the economy. A jurisdiction is a subset  $J \subset N$  of consumers who share consumption of the public good. A partition is an assignment of consumers to jurisdictions such that each consumer belongs to one and only one jurisdiction.<sup>1</sup> An allocation is a vector  $(g_1, \dots, g_n; x_1, \dots, x_n)$  where  $g_i$  represents the level of public service and  $x_i$ , itself a vector in  $E^m$ , the bundle of private goods consumed by the  $i$ th consumer. Each consumer has a preference ordering  $\succ_i$  over the points  $(g_i; x_i)$  in his consumption set  $X_i$ .<sup>2</sup> The  $i$ th consumer owns an initial bundle,  $w_i$ , of private goods. No public goods are initially owned, and public goods are unnecessary as a productive input.

To simplify the exposition, I will assume that, in the absence of the public good, we are dealing with a pure exchange economy: i.e., there is no

production of private goods. However, private goods can be used to produce the public good. For each potential jurisdiction  $J_j \subset N$  we define a production possibility set  $Y(J_j)$  such that  $y_j = (g_1, \dots, g_n; z)$  is possible for the jurisdiction  $J_j$  if and only if  $y_j \in Y(J_i)$  where  $z$  is the input of private goods into the production of the public good. I will assume that  $Y(J_j)$  is a closed convex cone and that  $0 \in Y(J_j)$  (i.e., inaction is possible) for every  $J_j \subset N$ . Now consider any partition  $P_k = \{J_1, \dots, J_r\}$  assigning each consumer to one and only one out of a set of  $r$  separate jurisdictions.<sup>3</sup> The aggregate production possibility set  $Y(P_k)$  under the partition  $P_k$  is then defined as  $Y(P_k) = \sum_{J_j \in P_k} Y(J_j)$ . An allocation  $(g_1, \dots, g_n; x_1, \dots, x_n)$  is feasible under the partition  $P_k$  if  $(g_1, \dots, g_n; z) \in Y(P_k)$  where  $z = \sum_{i=1}^n (x_i - w_i)$  is the aggregate input of private goods into public good production. Given our assumptions on the  $Y(J_j)$ ,  $Y(P_k)$  will also be a closed convex cone.

The concept of a Lindahl equilibrium for a pure public good, as formulated by Foley, is easily extended to the case of an arbitrary partition.

Definition: A Lindahl equilibrium under the partition  $P_k$ ,  $P_k = \{J_1, \dots, J_r\}$ , with respect to  $w = (w_1, \dots, w_n)$  is a feasible allocation  $(g_1, \dots, g_n; x_1, \dots, x_n)$  and a price system  $(p_g^1, \dots, p_g^n; p_x) \geq 0$  such that

- (a)  $\sum_{i=1}^n p_g^i g_i + p_x \cdot z = \sum_{i=1}^n p_g^i \bar{g}_i + p_x \cdot \bar{z}$  for all  $(\bar{g}_1, \dots, \bar{g}_n; \bar{z}) \in Y(P_k)$ ;
- (b) if  $(\bar{g}_i; \bar{x}_i) >_i (g_i; x_i)$ , then  $p_g^i \bar{g}_i + p_x \cdot \bar{x}_i > p_g^i g_i + p_x \cdot x_i = p_x \cdot w_i$ .

Observe that there is a separate public good price,  $p_g^i$ , for each individual.

In the Lindahl equilibrium producers maximize profits and consumers maximize utility taking prices as given. It is not difficult to prove that a Lindahl equilibrium under a partition exists and is Pareto efficient relative to the partition.<sup>4</sup>

A Lindahl equilibrium under a partition is clearly not the type of price system that Tiebout or McGuire have in mind. In their analysis the assignment of consumers to jurisdictions is not predetermined: prices are supposed to determine an optimal partition as well. The definition of a Lindahl equilibrium under a partition contains no information about production possibilities under alternative partitions. This information is contained, however, in the following aggregate production set:

$$Y = \bigcup_{P_k \in \mathcal{P}} Y(P_k)$$

where  $\mathcal{P}$  is the set of all possible partitions. Replacing  $Y(P_k)$  by  $Y$  in the definition of a Lindahl equilibrium given above yields a definition of a global Lindahl equilibrium. If a global Lindahl equilibrium exists, then it is in the core and it is globally Pareto efficient.<sup>5</sup> However, the usual methods of proving existence break down in this case because convexity of the  $Y(P_k)$  no longer guarantees convexity of the aggregate production possibility set. An example in which no global equilibrium exists even though there are allocations in the core is presented below.<sup>6</sup>

We will illustrate the preceding discussion by considering a three-person economy in which all consumers have identical tastes represented by the utility function

$$u_i = x_i g_i \quad (i = 1, 2, 3) .$$

For any jurisdiction  $J_j$ , the vector  $y(J_j)$  is technically possible if and only if

$$y(J_j) = (g_1, g_2, g_3; z) \in Y(J_j) .$$

We will assume that any one-person jurisdiction can produce one unit of



the public good using  $a_1$  units of the private good. Thus, if consumer 1 forms a jurisdiction,

$$(1,0,0; -a_1) \in Y(\bar{1}) .^7$$

If  $Y(\bar{1})$  is a cone, then any scalar multiple  $\lambda(1,0,0; -a_1)$ ,  $\lambda \geq 0$ , is also in  $Y(\bar{1})$ . Assuming that these are the only production possibilities for the jurisdiction  $\bar{1}$ ,

$$Y(\bar{1}) = \{y(\bar{1}) \mid y(\bar{1}) = \lambda(1,0,0; -a_1), \lambda \geq 0\} .$$

We will assume that the single member jurisdictions  $\bar{2}$  and  $\bar{3}$  are also capable of producing one unit of the public good using  $a_1$  units of the private good, and the production possibility sets  $Y(\bar{2})$  and  $Y(\bar{3})$  are defined accordingly.

We will assume that two-member jurisdictions can produce one unit of the public good using  $a_2$  units of the private good. We then define

$$Y(\bar{12}) = \{y(\bar{12}) \mid y(\bar{12}) = \lambda(1,1,0; -a_2), \lambda \geq 0\} .$$

for a jurisdiction formed by consumers 1 and 2;  $Y(\bar{13})$  and  $Y(\bar{23})$  are defined in the same way.

Finally, if all three consumers form a single jurisdiction, then

$$Y(\bar{123}) = \{y(\bar{123}) \mid y(\bar{123}) = \lambda(1,1,1; -a_3), \lambda \geq 0\} .$$

If we assume that reducing the size of a jurisdiction never makes it more costly to provide a given level of the public good, then we must have  $a_1 \leq a_2 \leq a_3$ . If  $a_1 = a_2 = a_3$ , then  $g$  is a pure public good, and any Pareto efficient allocation can be achieved through a three-person jurisdiction. If, on the other hand, either of the inequalities holds strictly, then the public good is subject to "crowding" and decentralization may be required in order to obtain an efficient allocation of resources.

Consider the case where  $a_1 = a_2 = 1$  and  $a_3 = 3/2$ . No additional resources

are required to provide the same level of public service to two consumers rather than one, but increasing the size of jurisdiction from two to three members requires fifty percent more input if output quality is held constant. Assume that initial endowments are  $w_1=w_2=2$  and  $w_3=1$ . The only allocation in the core <sup>8</sup> is  $(g_1, g_2, g_3; x_1, x_2, x_3) = (2, 2, 1/2; 1, 1, 1/2)$  which is achieved under the "stratified" partition  $\{\bar{1}, \bar{2}, \bar{3}\}$ . This decentralized system of jurisdictions reflects a balancing of jurisdictional consensus and the economies of shared consumption, and the allocation is sustained by a Lindahl equilibrium relative to the partition with price vector  $p = (p_g^1, p_g^2, p_g^3; p_x) = (1/2, 1/2, 1; 1)$  where the private good has been chosen as numeraire, setting  $p_x=1$ .<sup>9</sup> This Lindahl allocation is globally as well as relatively Pareto efficient. However, it is not a global Lindahl equilibrium. For example, the vector  $(\bar{g}_1, \bar{g}_2, \bar{g}_3; \bar{z}) = (1/2, 2, 2; -5/2)$  is feasible under the partition  $\{\bar{1}, \bar{2}, \bar{3}\}$ , and it yields a profit  $p \cdot (1/2, 2, 2; -5/2) = 3/4 \geq 0$  which violates condition (a) of the definition of a global Lindahl equilibrium. The Lindahl prices sustaining the core allocation under the partition  $\{\bar{1}, \bar{2}, \bar{3}\}$  do not yield accurate information concerning the profitability of allocations achievable under alternative assignments of individuals to jurisdictions.

Although we must conclude that it is, in general, unreasonable to expect prices to provide much guidance in determining an optimal pattern of decentralization, this does not mean that a global Lindahl equilibrium can never exist. In particular we expect the effects of nonconvexity to be attenuated if the efficient size of jurisdictions is, in some sense, small relative to the number of consumers. Along these lines McGuire has suggested that a situation in which consumers are able to sort themselves into completely

homogeneous jurisdictions of efficient size will be favorable to the existence of a market for local public goods.

In our three-person example, the wealthy consumers are able to form an efficient two-person jurisdiction, but the third consumer must go it alone. Suppose that we add a fourth consumer with endowment  $w_4=1$ . Retaining the same assumptions on the production possibility sets for jurisdictions of size three or less, we define

$$Y(\overline{1234}) = \{y(\overline{1234}) \mid y(\overline{1234}) = \lambda(1,1,1,1; -a_4), \lambda \geq 0\}$$

where production vectors now take the form  $(g_1, g_2, g_3, g_4; z)$  and where  $a_4=2$ . Thus, we still have a type of "constant returns to scale" for jurisdictions containing two members or more, and the two consumer types are able to stratify into homogeneous two-person jurisdictions.

Consider the stratified partition  $\{\overline{12}, \overline{34}\}$ . The Lindahl equilibrium relative to this partition results in an allocation

$$(g_i; x_i) = \begin{cases} (2; 1) & \text{for } i = 1, 2 \\ (1; 1/2) & \text{for } i = 3, 4 \end{cases}$$

If we again set  $p_x=1$  for the numeraire commodity, all consumers face the same Lindahl price  $p_g^i=1/2$ . The Lindahl tax amounts to fifty percent of the value of each consumer's endowment:<sup>10</sup>  $t_1=t_2=1$  and  $t_3=t_4=1/2$ .

In contrast to the results for the three-person example, the Lindahl equilibrium relative to this partition is also the global Lindahl equilibrium: each consumer maximizes utility subject to his budget constraint  $p_g^i g_i + p_x \cdot x_i = p_x \cdot w_i$  evaluated at prices  $p_g^i=1/2$  and  $p_x=1$ , and there is no other feasible allocation under this or any other partition that is more profitable than the Lindahl allocation. Therefore, this allocation is globally Pareto

efficient and in the core.<sup>11</sup> In this example, at least, the Tiebout-McGuire hypothesis is borne out: a price system exists which guides consumers and producers to an optimal pattern of decentralization.

It would be appropriate at this point to characterize in general terms the conditions under which this type of "Tiebout equilibrium" will exist. While some results along these lines have been obtained, they will be presented on another occasion. This paper will focus instead on exploring the properties of the simple four-person economy described above.

## II The Politics and Economics of Decentralization

The global Lindahl equilibrium that we have determined for our four-person economy possesses some of the most important attributes of a standard competitive equilibrium: producers maximize profits and consumers maximize utility taking prices as given in a manner precisely analogous to a competitive equilibrium for a private good economy; the Lindahl equilibrium is globally Pareto efficient; and the Lindahl equilibrium is in the core. It is even possible to prove an analogue of the limit theorem of Debreu and Scarf, though we will not present that result here.

But our simple economy differs from a competitive private good economy in two significant respects. In the first place, the aggregate production possibility set remains non-convex even though the addition of a fourth consumer suffices to establish the existence of a global Lindahl equilibrium. Secondly, the decision to form a particular set of jurisdictions involves an intrinsic "political" element to the extent that such decisions are determined through some type of voting process. The presence of non-convexity is responsible for the jurisdictional stratification characteristic of

decentralized local government. The implications which follow from recognizing the political nature of the decentralization issue, which we have ignored so far in our discussion of the global Lindahl equilibrium, will be the subject of the present section.

A. Stratification Through Subdivision

Suppose that the four consumers in our economy find themselves residing within a single jurisdiction. When all four consumers must share consumption of the public good, Pareto efficiency implies a unique level of public good supply:<sup>12</sup>  $g = 3/2$ . The Lindahl equilibrium relative to the partition  $\{\overline{1234}\}$  results in an allocation

$$(g_i; x_i) = \begin{cases} (3/2; 1) & \text{for } i = 1, 2 \\ (3/2; 1/2) & \text{for } i = 3, 4 \end{cases}$$

sustained by a price vector

$$(p_g^1, p_g^2, p_g^3, p_g^4; p_x) = (2/3, 2/3, 1/3, 1/3; 1)$$

where we have arbitrarily set  $p_x = 1$ .

This allocation is neither globally Pareto efficient nor in the core. It is possible through decentralization to make everyone better off. The Lindahl allocation under the stratified partition  $\{\overline{12}, \overline{34}\}$  is, on the other hand, both globally Pareto efficient and in the core. Will the residents of the single jurisdiction agree, under these circumstances, to subdivide? Compare the utility vectors resulting from the two Lindahl equilibria:

$$(u_1, u_2, u_3, u_4) = \begin{cases} (3/2, 3/2, 3/4, 3/4) & \text{under } \{\overline{1234}\} \\ (2, 2, 1/2, 1/2) & \text{under } \{\overline{12}, \overline{34}\}. \end{cases}$$

Subdivision improves the welfare of the wealthy consumers, but the poor consumers are made worse off. Thus, unless offered compensation, the poor

will vote against subdivision.

If we make a minor simplification, this result can be given a graphical interpretation. We will assume that consumers of the same type receive the same level of utility. The utility frontier under the partition  $\{\overline{1234}\}$  is given by:

$$\sum_{i=1}^4 u_i = \left( \sum_{i=1}^4 w_i \right)^2 / 4a_4 = 9/2.$$

For the stratified partition  $\{\overline{12}, \overline{34}\}$ , the utility frontier is

$$(u_1 + u_2)^{1/2} + (u_3 + u_4)^{1/2} = \left( \sum_{i=1}^4 w_i \right) / 2a_2 = 3/2.$$

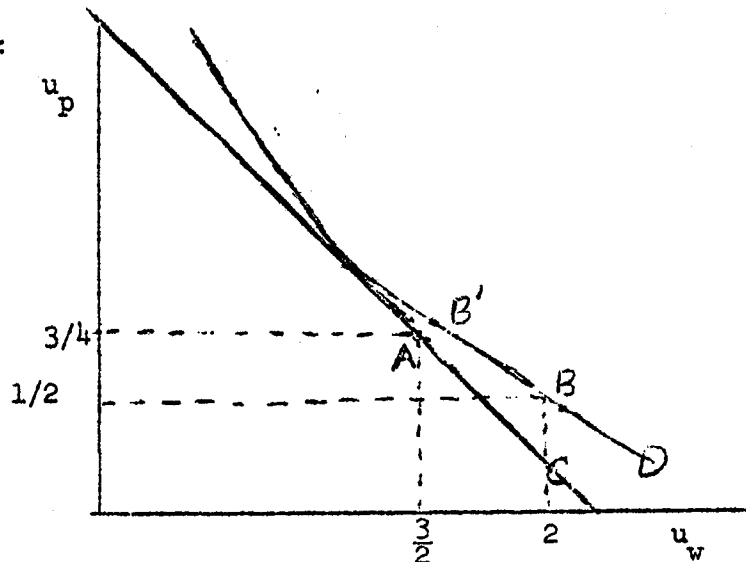
Setting  $u_1 = u_2 = u_w$  for the wealthy consumers and  $u_3 = u_4 = u_p$  for the poor, these utility frontiers take form:

$$u_w + u_p = \frac{9}{4} \text{ under } \{\overline{1234}\}$$

$$(2u_w)^{1/2} + (2u_p)^{1/2} = 3/2 \text{ under } \{\overline{12}, \overline{34}\}.$$

These frontiers are labeled C ("centralized") and D ("decentralized") respectively in Figure 1. The shift from point A (corresponding to the

Figure 1:



Lindahl allocation under the partition  $\{\overline{1234}\}$ ) to point B (corresponding to

the global Lindahl equilibrium) improves the welfare of the wealthy consumers, but it decreases the welfare of the poor. The welfare of both consumer types can be improved through subdivision by moving to a position such as B', but this requires the wealthy to compensate the poor for the change.

Thus, to the extent that stratification takes place through subdivision, the core as we have defined it<sup>13</sup> understates the bargaining power of the poor. In other words, it is quite possible that, contrary to our implicit assumption, exclusion will not be costless. The fact that subdivision of existing jurisdictions is a relatively rare phenomenon suggests that, for one reason or another, these exclusion costs are quite substantial.

#### B. Stratification of Existing Jurisdictions

While subdivision of existing jurisdictions is uncommon, stratification of existing jurisdictions occurs quite frequently. Suppose that our four consumers now find themselves residing in two separate heterogeneous jurisdictions of size equal to two. For concreteness, we assume that the partition is  $\{\overline{13}, \overline{24}\}$ . Assume for the moment that transportation costs are sufficiently high to prevent these consumers from "voting with their feet" -- they are locked into their respective jurisdictions.<sup>14</sup> The Lindahl equilibrium relative to this partition results in an allocation giving

$$(g_i; x_i) = \begin{cases} (3/2; 1) & \text{to } i = 1, 2 \\ (3/2; 1/2) & \text{to } i = 3, 4 \end{cases}$$

which is identical to the Lindahl allocation under the partition  $\{\overline{1234}\}$ .

Now imagine that the transportation system has improved so dramatically that voting with one's feet is completely costless. Consumers can now arrive at the stratified global Lindahl equilibrium without resorting to a vote to

change the size of jurisdictions. In the global Lindahl equilibrium, the poorer consumers, faced with the Lindahl prices, have no incentive to move into the wealthy jurisdiction. Stratification can occur in this fashion, therefore, without compensation of the poor by the wealthy.<sup>15</sup> This scenario seems to be not at all unrealistic. Williams et al. found that the outer ring of communities which effectively became suburbs of Philadelphia during the period 1950-1960 stratified during the same period. I suspect that a similar process has taken place in many if not most of our metropolitan areas.

While stratification of existing jurisdictions may move the economy in the direction of a global Lindahl equilibrium, the process is likely to fall short of a globally efficient allocation of resources. Many jurisdictions, particularly the central cities, are far too large. If we relax our assumption that intra-metropolitan commuting is costless, then the failure of existing jurisdictions to subdivide will lead to an excessive expenditure on transportation. Some high income households who would otherwise wish to live near the center of the metropolitan area will decide not to because of the poor quality of public services available in the central city. More significantly, low income households who wish to live near suburban jobs will find that suitably inexpensive housing is unavailable. The commuting expenditures of low income residents of the central city who travel to suburban job locations may be substantial, perhaps large enough in some cases to make unemployment a more attractive alternative.

In our four-person economy, stratification without compensation reduces the welfare of the poorer consumers while improving that of the rich. The distribution of income has, therefore, become less equitable in real terms.



However, this increased inequity is not reflected in the distribution of wealth which remains unchanged both before and after taxes. The distribution of income after taxes has remained relatively constant in the U.S. since World War II. To the extent that our analysis of the effects of stratification is applicable, the distribution of income in "real" terms may have worsened appreciably. For those in dire poverty, increased federal welfare expenditures may have offset these effects to some extent. The consumers who have felt the adverse impact of stratification most sharply are, therefore, probably those who are in the lower middle class, precisely those individuals associated with the "tax revolt" and alienation from the political process.

The popularity of federal revenue sharing may be a response to increasing stratification of urban local governments. The federal tax system for the most part treats individuals with the same income in the same way, but this policy will be inappropriate to the extent that metropolitan areas exhibit varying degrees of stratification. "Horizontal equity" will then require compensation of the residents of low income communities by the residents of high income communities, a function which revenue sharing schemes are clearly designed to serve. In an ideal system of local government finance, revenue sharing would probably be undesirable; however, it is a natural response given present institutional constraints.

#### C. The Role of Exclusionary Zoning

In a global Lindahl equilibrium the poor have no incentive to move into wealthy jurisdictions: the flat Lindahl taxes are an effective exclusionary device. But wealthy suburbs in fact seem to fear the possibility of low income households moving into their community, and as a result they resort

to exclusionary zoning. Are these fears groundless and zoning ordinances unnecessary to maintain stratification? While exclusionary zoning would be unnecessary if revenue were raised through Lindahl taxes, local governments usually rely instead on some form of property tax. Because we have not introduced a housing commodity into our analysis, we cannot discuss the impact of a property tax on the behavior of local government. We will consider instead a tax proportional to the value of a consumer's endowment,  $p_x w_i$ .

In all of the examples we have discussed, the Lindahl tax  $t_i$  is equal to 50% of the value of the individual's endowment. Thus, the Lindahl tax can be interpreted as a proportional tax of 50% of wealth:  $t_i = .5 p_x w_i$ . However, while the wealthy will have no incentive to move into the poor jurisdiction, the poor consumers will move into the wealthy community if they believe that they will be charged not the flat Lindahl tax but a tax equal to 50% of the value of their endowment. Because the tax rate is .5 in either jurisdiction and better services are available in the wealthy community, the poor consumers will move into the wealthy jurisdiction. Of course, this jurisdiction can no longer continue to finance the same level of public service when the per capita tax base has fallen unless the tax rate is increased. In our example, the tax rate remains unchanged in the new Lindahl equilibrium but the level of public good output falls from 2 to  $3/2$ . As a result, the welfare of the wealthy consumers will decrease, but the poor consumers are better off than they were in the stratified Lindahl equilibrium.<sup>16</sup> To prevent the influx of the poor, the residents of the wealthy jurisdiction could switch to the flat Lindahl tax. But if, for some reason, this is impossible, then they may rationally decide to enact some zoning ordinances.

If residence in a jurisdiction entails the purchase or rental of a house, then exclusion may also be accomplished by bidding up the price of housing. However, in an earlier paper [Ellickson(1971)] analyzing a stratified equilibrium for a model with a housing commodity and a property tax, I demonstrated that high income households will be able to maintain stratification in this way only if the public good and housing are not too substitutable in consumption. If, on the other hand, they are relatively good substitutes, then high income households may decide to require minimum standards for lot size, floor space and the like in order to maintain stratification.

### III The Optimal Structure of Local Government

The theory of local public goods presented in this paper needs to be elaborated in a number of directions. The numerical example we have discussed can be easily modified to permit more than two wealth classes, and the conclusions we have reached carry over directly. However, sufficient conditions for the existence of a global Lindahl equilibrium should be explored within the context of the general model. While our discussion has been confined to an economy with a single type of public good, the analysis should be extended to the case of local governments providing a number of different public services.<sup>17</sup> A realistic theory also requires explicit introduction of a housing commodity and a transportation system. In spite of these limitations, the results obtained so far suggest that a coherent theory of local public goods is well within our grasp.

What do the results we have obtained so far imply about the optimal structure of local government? The first point to emphasize is that the case

for decentralization on efficiency grounds is very strong and that this case does not hinge on the existence of a global Lindahl equilibrium.<sup>18</sup> The optimal degree of decentralization depends crucially on the extent to which provision of public goods exhibits economies of scale. There seems to be widespread agreement that, for most local public goods, economies of scale are insignificant after jurisdictions reach a size of 50,000 or so. I suspect that this figure grossly overstates the advantages of larger jurisdictions. Throughout this paper I have substituted the phrase "economies of shared consumption" for the more usual "economies of scale" in order to suggest that a jurisdiction be regarded as a consumption unit rather than a production unit. There is no reason why a jurisdiction must produce the public services that it consumes. Just as a household purchases services produced by "firms", a jurisdiction can contract out for public services, and experience with the "Lakewood plan" in Los Angeles indicates that a procedure of this sort is quite feasible. If contracting for public services is allowed, then economies of shared consumption probably justify jurisdictions no larger than a small neighborhood. The crucial constraint on reduction of jurisdiction size, in that case, is likely to be the cost of making collective decisions. Many suburbs appear to perform this function quite effectively with no more than 5,000 households within their boundaries.

As stated a moment ago, decentralization can be justified whether a global Lindahl equilibrium exists or not. The significance of a global Lindahl equilibrium, if it exists, is that a price system is provided which will guide consumers and producers to an efficient pattern of decentralization and that the price system takes a particularly simple form: everyone within

a jurisdiction will pay the same tax. If the optimal size of jurisdictions is small relative to the population of the metropolitan area, as I suggest in the preceding paragraph, then the conditions guaranteeing existence of a global Lindahl equilibrium are likely to be satisfied. In any case, I suspect that a system of flat taxes will lead to an allocation that is approximately a global Lindahl equilibrium.<sup>19</sup> Because the costs of administering a more complicated pricing scheme are probably substantial, the "near equilibrium" achieved under a system of flat taxes may well be efficient in some broader sense.

In an optimally decentralized system with global Lindahl pricing, exclusionary zoning would be superfluous. Although the use of zoning was not inconsistent with an efficient allocation of resources in our four-person example, it will be undesirable in a more realistic setting. If we relax the assumption that utility functions are identical, then zoning can lead to inefficient exclusion from jurisdictions providing high quality public services of low income consumers with a strong preference for public goods. Zoning may also be undesirable on other grounds: e.g., it may serve as a mechanism to exclude people on the basis of race. Thus, in a decentralized system with Lindahl pricing a strong case can be made for a strict curtailment, if not elimination, of the zoning powers of local jurisdictions.

Although decentralization may result in a more efficient allocation of resources, there is no reason to expect lower income households to accept such a program. Local government is under considerable pressure, particularly from the courts, to provide equal public services to everyone within a metropolitan area. High income households would benefit from decentralization,

but low income households have much to gain from consolidation. The need for a compromise seems obvious and, in that spirit, a strong case can be made for the establishment of a metropolitan government. This government should, at the very least, be given responsibility for planning land use, developing a metropolitan transportation system, regulating pollution and congestion through an appropriate system of taxes and subsidies and providing those services which exhibit substantial economies of scale. Although more controversial, a strong argument can be made for financing public schools through metropolitan government with complete equality of expenditure per pupil throughout the metropolitan area.

Establishment of a metropolitan government along these lines would probably be opposed by most high income households. However, in exchange for their acceptance of this proposal, any group of consumers would be permitted to form a separate jurisdiction to provide the remaining types of public services. By offering something to both low and high income groups, a proposal of this sort might be able to avoid the fate of most proposals for local governmental reform.

Although the analysis is obviously different, the approach to local government developed in this paper is consistent in a fundamental sense with the work of Rothenberg and Wood. Both authors emphasize the perverse impact on local government of jurisdictional stratification motivated by a desire to avoid income redistribution. Wood characterized the nature of politics within fragmented local governments as more akin to a "spirit of fraternity" than the ideal of "grassroots democracy." While acknowledging that neighborhood jurisdictions have a legitimate role to play, he argues that genuine "politics" -- in contrast to club formation -- can take place only at the

metropolitan level. Thus, he reached the conclusion that metropolitan government can be justified on the grounds that it produces "a better brand of politics." Our analysis suggests that a restructuring of local government along those lines would produce a better brand of economics as well.

FOOTNOTES

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- 1 In the case of a pure public good, all consumers belong to a single jurisdiction. However, we will regard as admissible any assignment of consumers to jurisdictions provided that it forms a partition.
- 2 Because no theorems are proved in this paper, it serves no useful purpose to summarize the assumptions made in Ellickson (1972) concerning the preference orderings and consumption sets. It is important to note, however, that I am assuming that individual preference orderings are independent of the partition. While consistent with the analysis of McGuire, this assumption is quite restrictive and will be relaxed at a later date.
- 3 An assignment  $\{J_1, \dots, J_r\}$  is a partition if and only if  $J_j \cap J_{j'} = \emptyset$  all  $j \neq j'$  and  $\bigcup_{j \in P_k} J_j = N$ .
- 4 See Ellickson (1972).
- 5 Loc. Cit., Theorem 1. In contrast, a Lindahl equilibrium under a partition need not be in the core and is necessarily Pareto efficient only relative to other allocations which are feasible under the same partition. For a more complete discussion of the core analysis, see Ellickson (1972).
- 6 This example is discussed in greater detail in the paper cited above.
- 7 To simplify notation we will denote the jurisdiction  $\{1\}$  by  $\bar{1}$ ,  $\{1,2\}$  by  $\bar{1,2}$ , etc.



- 8 An allocation is in the core if and only if it is not possible for any coalition of consumers using only their own resources to obtain a higher level of utility for each of its members. In this example, the utility vector  $\{u_1, u_2, u_3\}$  is in the core if and only if  $u_i \geq w_i^2/4$  for all  $i$ ,  $u_i + u_j \geq (w_i + w_j)^2/4$  for all  $i, j$  with  $i \neq j$  and  $u_1 + u_2 + u_3 = (w_1 + w_2 + w_3)^2/4$ .
- 9 For a complete discussion of how to determine the Lindahl equilibrium for this example see the paper cited above.
- 10 By definition, the Lindahl tax  $t_i = p_g^i g_i$  for each consumer  $i$ .
- 11 Loc. cit., Theorem 1.
- 12 The unique Pareto efficient level of the public good is given by the expression  $g = (\sum_{i=1}^4 w_i) / 2a_4$ .
- 13 In other words, the core must be redefined to reflect the power of individuals to block changes in jurisdictional structure through the political process.
- 14 If I can be permitted some literary license, I am assuming that consumers have no feasible alternative but to live near their place of work.
- 15 Of course, in this four-person example it is reasonable to suppose that the poor consumers will refuse to move. If we replicate the economy so that there are many consumers of each type, then this difficulty can be eliminated.
- 16 The example discussed in part A of this section is directly applicable.
- 17 In the most obvious extension of the model, a separate set of jurisdictions will exist for each public good. However, it seems almost certain that efficiency will require jurisdictions to supply jointly a number of public services.

- 18 In our three-person example, the partition which will be efficient depends on the degree of equality desired by society. If the allocation is to be relatively equitable, then the partition  $\{\overline{123}\}$  is optimal. If a substantial degree of inequality can be tolerated, then the partition  $\{\overline{12}, \overline{3}\}$  will be optimal. In the four-person example, on the other hand, the partition  $\{\overline{1234}\}$  will be optimal only if complete equality is desired: i.e.,  $u_1 = u_2 = u_3 = u_4$ , and even in that case the same allocation can be obtained under a stratified partition (e.g.,  $\{\overline{12}, \overline{34}\}$  if  $w_1 \leq w_2 \leq w_3 \leq w_4$ ).
- 19 The type of theorem I have in mind is discussed in Chapter 5 of Arrow and Hahn.
- 20 I am borrowing here a phrase from Buchanan.

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