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# AN EFFICIENCY BASIS FOR FEDERAL FISCAL EQUALIZATION

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Discussions of the "financial crisis" faced by state and local governments in the United States are continuing, and pressures mount for some form of remedial action. Various bloc-grant and revenue-sharing proposals began to command increasing attention in the mid-1960's. Almost all of the suggested bloc-grant schemes involve the transfer of tax revenues from the federal to the state-local governments with some provision made for equalizing adjustments in state shares.<sup>1</sup>

Strong arguments can be mustered to support tax sharing in a federalist system. In its basic form, however, tax sharing is explicitly nonequalizing as among separate states. We shall neglect this here; our paper is limited to an examination of possible efficiency bases for the introduction of *equalizing* elements into a program of bloc or unconditional grants. Several economists, including one of the authors, have advanced equity arguments to support fiscal equalization. But we propose also to leave this set of issues out of this discussion. Our

NOTE. Wagner's research was supported by a grant from the Reim Foundation.

<sup>1</sup> The "Heller-Pechman scheme" is the most familiar of the various plans, especially among economists, although the Pechman Task Force Report in which it was initially outlined was never officially released. Specific proposals are contained in Walter H. Heller, "Strengthening the Fiscal Base of our Federalism," in his *New Dimensions of Political Economy*, New York, 1966, pp. 117-72; and Joseph A. Pechman, "Financing State and Local Government," *Proceedings of a Symposium on Federal Taxation*, New York, 1965, pp. 71-85. Other proposals, all of which are similar in essential respects, are associated with the names of Congressman William Brock, Secretary of Defense Melvin Laird, and Senators Charles Goodell and Jacob Javits. The Republican Coordinating Committee has also proposed a broadly similar policy scheme.

analysis is confined solely to efficiency considerations relative to equalization.

In Section I, the previous discussion on efficiency and equalization is selectively and briefly reviewed. Section II analyzes fiscal equalization under the assumption that state and local governments provide purely public or collective goods, and that they do so efficiently. Section III drops the assumption of purely public nature of government-provided goods and introduces impure public goods. This change is demonstrated to have significant implications for the analysis and the ultimate set of policy conclusions. Section IV specifically examines some of the more relevant policy suggestions that emerge from the analysis.

## I. Some Previous Discussion

Early analyses of federal finance were all grounded in neoclassical orthodoxy. The overriding efficiency norm was summarized in the term "least-price distortion," and there was little or no integration between the tax and the expenditure sides of the fiscal account. In his early work, Buchanan reduced the analysis to interindividual comparisons that allowed both sides of the account to be considered. His predominant concern was, however, the satisfaction of horizontal equity norms, and efficiency considerations were treated as secondary. Buchanan did argue, nonetheless, that the set of interarea fiscal transfers designed to achieve horizontal equity over geographic space in a national economy was defensible on efficiency grounds. If resources are to yield the maximum gross product, defined in price values of privately produced goods and services, differential fiscal treatment of the like resource units must be eliminated.<sup>2</sup>

A. D. Scott independently came to the opposing conclusion about the efficiency effects of equalizing transfers, and several of the fundamental issues here were treated in the Buchanan-Scott exchange that followed.<sup>3</sup> Scott argued that transfers from richer to poorer areas

<sup>2</sup> James M. Buchanan, "Federalism and Fiscal Equity," *American Economic Review*, Vol. 40, September 1950, pp. 583-99.

<sup>3</sup> Anthony D. Scott, "A Note on Grants in Federal Countries," *Economica*, Vol. 17, November 1950, pp. 416-22; James M. Buchanan, "Federal Grants and Resource Allocation," *Journal of Political Economy*, Vol. 60, June 1952, pp. 208-17; Scott, "Federal Grants and Resource Allocation," *ibid.*, December 1952, pp. 534-36; Buchanan, "A Reply," *ibid.*, pp. 536-38.

slow down resource reallocation, thereby reducing national income and its rate of growth. Transfers were alleged to provide amenities to persons living in states with poor resource endowments, amenities that reduce incentives to migrate to wealthier, more productive areas. Buchanan argued that no generalized conclusions of this sort were possible, and that different types of transfers exert different effects on resource shifts. Some grants were alleged to affect potential migration decisions for high productivity families while others affected low productivity families. Hence, grants for unemployment compensation seemed likely to be more resource distorting than grants for education. Buchanan's argument here may be interpreted as a negative basis for equalization; it was held that a properly designed grant program need not distort the regional allocation of resources. Buchanan did not, however, emphasize the positive arguments, implicit in his earlier paper, in demonstrating that some equalization is necessary to prevent regional allocation distortion. In retrospect, the whole Buchanan-Scott discussion was not so pointed as it might have been because each participant employed a different analytical framework. Scott assumed an economy out of long-run equilibrium whereas Buchanan's implicit model was one of comparative statics.

Until the mid-1950's, despite some recognition of the inadequacy of existing models, the discussion of federal finance remained strictly neoclassical in the sense that efficiency in allocation was defined in terms of GNP measured by market prices of private goods and services. The general inadequacy of the private-goods, neoclassical orthodoxy was revealed in Paul A. Samuelson's two fundamental papers on public-goods theory.<sup>4</sup> For the first time, at least in the English language tradition, efficiency norms were extended to the world that included public as well as private goods. The whole notion of allocative efficiency in public finance was modified, and subsequent discussions of federal finance reflected this change in the underlying analytical framework.

The 1959 Universities-NBER Committee Conference provided the occasion for papers on federal finance by Tiebout and Musgrave.<sup>5</sup>

<sup>4</sup> Paul A. Samuelson, "The Pure Theory of Public Expenditure," *Review of Economics and Statistics*, Vol. 36, November 1954, pp. 387-89; "Diagrammatic Exposition of a Theory of Public Expenditure," *ibid.*, November 1955, pp. 350-56.

<sup>5</sup> Charles M. Tiebout, "An Economic Theory of Fiscal Decentralization," *Public Finances: Needs, Sources, and Utilization*, New York, NBER, 1961, pp. 79-96; Richard A. Musgrave, "Approaches to a Fiscal Theory of Political Federalism," *ibid.*, pp. 97-122.

Tiebout incorporated modern public-goods logic in his efficiency examination of multilevel fiscal structures, and his paper contains the seeds of many subsequent and more detailed analyses. The second part of Musgrave's paper contains the material relevant to the question we are trying to analyze here. Musgrave noted that if all states provide public goods efficiently, in terms of the standard public-goods efficiency conditions, net fiscal differentials among separately-located equals will be eliminated, and, consequently, Buchanan's earlier joint equity-efficiency argument for the making of equalizing interarea transfers would vanish. In his criticism of the Musgrave paper, Buchanan noted that net fiscal differentials would continue to exist even when all states provide public goods efficiently because of the relevance of total as well as marginal fiscal effects in locational decisions.<sup>6</sup> Richer communities can provide a higher taxpayer's surplus than poorer communities, so movement will take place in response even if the necessary marginal conditions for public-goods efficiency are fully satisfied. To this argument, Musgrave replied that he did not think that

. . . such influences on the location of X should be classified as "distorting" the regional allocation of resources. Rather it appears that they constitute a given datum for location, just as does the geographical location of natural resource deposits. The fact that the benefit incidence of public services is spatially limited, and that this has a bearing on how people wish to group themselves, is part of the economic map which determines resource allocation. Efficiency is not served by erasing this feature of the map. Indeed, a central policy aimed at nullifying resulting differentials (such as remain with universal benefit taxation) in state finance will interfere with efficiency in the regional structure of public finances.<sup>7</sup>

In terms of the models presented prior to his contribution, Musgrave's reply seems essentially correct. Within that context, there appeared to be no efficiency basis for fiscal equalization so long as the several states provided public goods efficiently. State-local governments rely, of course, on the traditional tax instruments to finance their outlays; hence, the conditions for allocative efficiency are necessarily violated. This raises the interesting question as to whether

<sup>6</sup> James M. Buchanan, "Comment," *ibid.*, pp. 122-29; along with Musgrave's "Reply," *ibid.*, pp. 132-33. Much of the literature has been surveyed recently in Anthony D. Scott, "The Economic Goals of Federal Finance," *Public Finance*, Vol. 19, 1964, pp. 241-88.

<sup>7</sup> Musgrave, *op. cit.*, p. 133.

efficiency norms can be invoked in support of fiscal equalization when state-local systems are inefficiently organized.<sup>8</sup> But this question is not our primary concern here. Instead, we shall assume in our basic models that state-local governments provide public goods efficiently, and we shall reexamine the efficiency basis for fiscal equalization.

## II. Purely Public Goods under State Provision in a Federalism

### *A Constant Cost, Full Mobility Model*

Initially we shall postulate the existence of a wholly closed economy extending over a defined geographic space. All goods and services are fully divisible as among persons; that is, all goods and services are purely private. The economy is perfectly competitive and *all* resources are fully mobile over space. In this initial model, "land," as such, or space itself, is not a productive resource. There are no natural advantages in particular locations.

Under these conditions, resource equilibrium is attained when identical units of resource earn like returns at the several margins of employment.<sup>9</sup> National product will be maximized by the allocation dictated by this equilibrium. Resource units in the broad functional classifications need not be fully homogeneous, of course, and there may exist many different resource categories or classes. Therefore, earnings will vary widely among separate resource classes even though returns are equal for all units within each particular class. In this equilibrium allocation, we should expect to find that different areas of the geographic space would be characterized by differing mixes among resource classes. Some such pattern may be generated by assuming random locational shifts, or we may think of spatial clustering in response to differential limits of market specialization. In any case, equilibrium will be characterized by variations in per capita incomes among different areas of the national economy. Some regions will contain relatively more high income earners than others.

<sup>8</sup> See Albert Breton, "A Theory of Government Grants," *Canadian Journal of Economics and Political Science*, Vol. 31, May 1965, pp. 175-87. In this paper, Breton supported a system of grants partially on these grounds, but he did not develop the analysis fully.

<sup>9</sup> We neglect the possibility of equalizing differences in monetary returns since this is not directly relevant for our analysis.

The income structure of the surface will be similar to its central place structure; in both cases a hierarchical ranking in terms of income and order of central place can be formed.<sup>10</sup> The basic idea of central place theory is that there exists a hierarchy of cities and types of goods. A city of order  $n + 1$  provides the same activities as cities of order  $n$ , plus additional activities, not found in lower order places, that service both the higher order place and its tributary area of lower order places. Likewise, a city of order  $n + 2$  provides the same activities as cities of order  $n + 1$ , plus additional activities not found in the lower order places. A hierarchical order of cities and goods is thus formed. Christaller described a system of central places in terms of the now-familiar geometrical pattern of interlocking regular hexagons. In terms of the strict geometry, the hexagonal-shaped areas and the regular spacing of central places are clearly not accurate descriptions of empirical reality. Central place theory can be viewed much more favorably, however, as a perceptive way of looking at the spatial structure of an economy rather than as an attempted theoretical explanation of reality. In this manner, the notion of higher and lower order goods and places is maintained, but the rigid geometrical patterns are considered only as a way of looking at the spatial structure.<sup>11</sup> Under the postulated conditions of competitive equilibrium, perfect resource mobility, and a uniform distribution of resource endowments over the area, regional variation in per capita income will reflect the variation in the central place structure of the area.

We now impose a federalized political structure on this all-private-goods economy. Initially, we assume that the central government, which is coincident in area with the national economy, exists but that it provides no goods and services. Subordinate units of government—states—contain equal populations, and each state provides a single purely public good under ideally neutral conditions. Each citizen pays a marginal tax-price equal to his own marginal evaluation for the

<sup>10</sup> The seminal contribution to central place theory, which attempts to explain the size and geographical distribution of and the functional variation among cities and their tributary areas, is Walter Christaller, *Die zentralen Orte in Süddeutschland*, Jena, 1933, a large part of which has been recently translated by Carlisle W. Baskin, *Central Places in Southern Germany*, Englewood Cliffs, N.J., 1966. For a comprehensive bibliography, see Brian J. L. Berry and Alen Pred, *Central Place Studies: A Bibliography of Theory and Applications*, Philadelphia, 1965.

<sup>11</sup> For an excellent criticism of Christaller's geometry along these lines, see Rutledge Vining, "A Description of Certain Spatial Aspects of an Economic System," *Economic Development and Cultural Change*, Vol. 3, January 1955, pp. 147-95 (especially pp. 164-66).

good, and the summed marginal evaluations equal marginal cost. The required total conditions are also assumed to be met.<sup>12</sup> Furthermore, we assume that the range of publicness extends only to state boundaries; there are no spillovers beyond these limits.

If this public-goods provision by the separate state governments is suddenly imposed on the pre-existing private-goods equilibrium, the latter no longer holds even when the public goods are, in themselves, supplied efficiently. The higher income states are able to provide the same quantity of the public good at lower tax rates, or a larger quantity at the same tax rates. The tax-price per unit of public good will, in any case, be lower in the wealthier areas. This provides a strictly fiscal incentive for individuals to migrate to the wealthier regions of the economy.

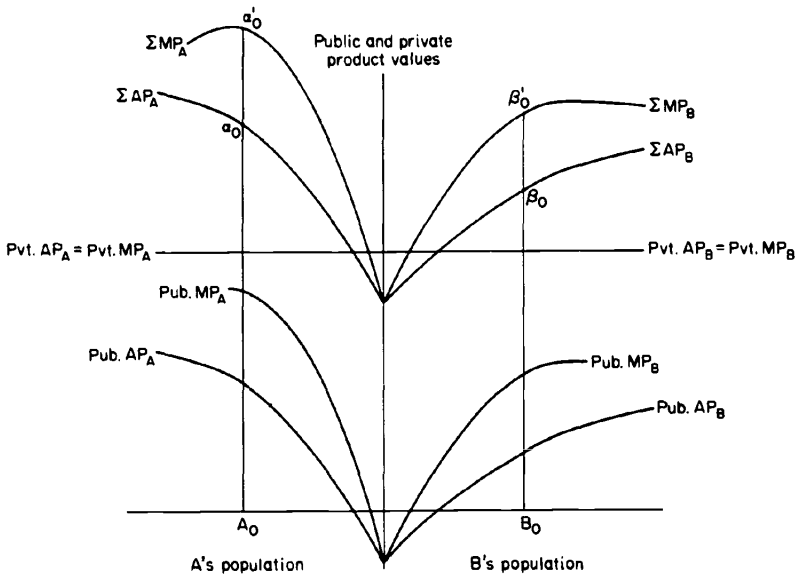
Under the starkly simple conditions of this model, this resource flow will continue until all persons are located in the single highest income state. Under the constant-cost assumption, private resources are equally productive in all areas; hence no private goods are sacrificed by resource shifts as among areas. And, since one production unit of a purely public good embodies an unlimited number of potential consumption units within the appropriate geographic limits, residents who move from one area to another secure the full value of this consumption without reducing the public-goods consumption of prior residents. Consequently, resources initially required for public-goods production in the areas of out-migration can be released once resources have shifted. Under such conditions as these, total value of output is maximized only when the entire population is located in a single state.<sup>13</sup>

<sup>12</sup> The significance of the individual and total marginal conditions for the tax-pricing of publicly provided goods is discussed in James M. Buchanan, *The Demand and Supply of Public Goods*, Chicago, 1968.

<sup>13</sup> Some problems of national product accounting might fruitfully be raised here to indicate some of the issues introduced by public goods. The existing convention is to measure private goods at market prices and public goods at cost outlays. Under these circumstances, it is quite conceivable that current measures for national product would exhibit no change after the movement of all resources to one region. Before movement the national product of *AB* is the sum of the market values of private goods and the cost-outlays on public goods in the two areas. After all resources shift to *B*, the only difference is in accounting for the resources that were formerly used for public-goods production in *A*. It seems entirely possible that the cost-outlay of this former production in *A* would not differ from the market value of private goods now produced in *B* by the released resources. If so, no change in national product would be reported. Some of the issues raised by public goods for national accounting are examined in Richard A. Musgrave, *The Theory of Public Finance*, New York, 1959, pp. 184–201, and by Francesco Forte and James M. Buchanan, "The Evaluation of Public Services," *Journal of Political Economy*, Vol. 69, April 1961, pp. 107–21.



FIGURE 1



Although the argument here is straightforward, geometrical illustration will prove helpful in providing a framework for later discussion of more complex models. Figure 1 presents a model of population allocation between states *A* and *B* in a two-state federalism. The abscissa measures total population in each state; we assume that the total population in the federalism is fixed. Along the ordinate, we measure the values for both private and public product, as these are related to population, for a single person. Under the assumptions of this model, movement from one region to the other does not affect private product values. This is reflected in the constant value for the curves of marginal and average private product over-all sizes of population.<sup>14</sup>

The curves for public-product value must be more carefully examined. Once each state commences to provide the single public good, efficiently under our assumption, there will arise recognizable differences between the two regions for the individual. The greater per capita

<sup>14</sup> Since the product curves are those experienced by a single person, these have a common point on the ordinate. The individual is equally productive in the market economy regardless of his location. The fact that relatively more high income earners reside in state *A* does not affect the private productivity of any single person in this model.

income in *A* insures either that the same quantity of the public good can be provided at a lower tax-price than in *B* or that some greater quantity can be provided at the same tax-price. In any event, the individual faces a potential fiscal gain in migrating from *B* to *A* over reasonable patterns of population distribution. As drawn in Figure 1, the public product value curves originate along the ordinate at negative values. This indicates that, over some initial ranges of population concentration in either state, the individual may secure a negative "taxpayer's surplus" because of the relatively small number of taxpayers available to share in the cost of the public facility. As population increases in each state, we assume that the "mix" among income-earning types is representative of that which characterizes the equilibrium pattern. This means that the curve for public-product value in *A*, the state with the relatively higher per capita income, diverges from that in *B* as soon as we depart from the one-person level in each state.

It should be emphasized that the curves for public-product value faced by the individual embody both tax-price and benefit components. In this model, where the goods provided by the two states are, by definition, purely public in the Samuelsonian sense, the individual's evaluation of the service flow received is not directly influenced by the number of persons with whom he shares the benefits. On the tax-price side, however, the individual's net fiscal position is affected. As more persons enter the sharing group, the tax-price to any resident member declines so long as new entrants pay any taxes at all.

If we take the simplest case of equal per capita sharing in costs of the public good, average tax-price declines with in-migration along a rectangular hyperbola, assuming a fixed-sized public facility. For almost any other reasonable sharing assumption, and with variability allowed in the size of the public facility, the hyperbolic decline in tax-price remains characteristic, although no particular shapes can be assigned. It is this decline in average tax-price for the individual resident in the state which experiences in-migration that generates the curves of rising average and marginal public-product values as population increases. As the construction indicates, the curves tend asymptotically toward some maximum value equal to the individual's marginal evaluation of the public good. Tax-price to the individual approaches zero as population tends to infinity, leaving only the benefit component.<sup>15</sup>

<sup>15</sup> It should be noted that our analysis does not assume a fixed size facility. As the tax-price of the public good falls, more will be demanded so long as the price elasticity of demand exceeds zero. Likewise, less will be demanded in the state where the tax-price increases.

We can now sum the private and public product value curves to show the fiscal pressures that will induce migration away from the purely private-goods population equilibrium, which we can arbitrarily designate as  $A_0 = B_0$ . As Figure 1 shows, at this initial population allocation the summed product values, either in average or marginal terms, are greater in  $A$  than in  $B$ .<sup>16</sup> This will induce the individual, whose calculus the figure depicts, to migrate to  $A$ . As this sort of movement continues, the differential in product values between the two states for remaining persons will increase. In such a model as this, resource equilibrium is never attained because this requires an infinite migration. The final position reached is that which is imposed by the constraint of the fixed total population in the economy.<sup>17</sup>

### *An Increasing Cost, Ricardian Model*

"Realism" can be added to the analysis by introducing locational fixity in at least one productive factor, say, "land." The fiscal surplus or public-product value curves are unchanged from those drawn in Figure 1. But curves for private-product values are modified; these no longer are unaffected by population shifts. As the population of a state increases, the marginal productivity of a resource unit, measured in terms of derived private-product valuations, declines. This is indicated by the configuration of the marginal private-product value curves in Figure 2.<sup>18</sup> The purely private goods equilibrium population allocation is  $A_0$  in  $A$  and  $B_0$  in  $B$ , where the total population is  $A_0B_0$ .

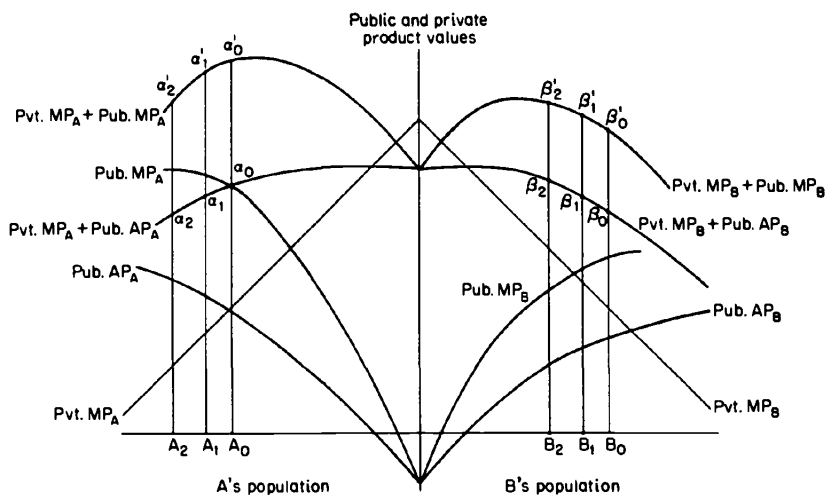
In this Ricardian model, there is a determinate amount of fiscally induced migration, given the initial assumption about the private goods equilibrium population distribution. This is indicated in the construction of Figure 2 where  $A_1 - A_0 = B_0 - B_1$  people have shifted from

<sup>16</sup> In marginal terms  $A_0\alpha'_0 > B_0\beta'_0$ ; in average terms  $A_0\alpha_0 > B_0\beta_0$ .

<sup>17</sup> This conclusion is not independent of the initial population distribution assumption. If population differences are sufficiently wide, the fiscally-induced migration flows may be reversed. If the initial population in  $A$  is sufficiently small relative to that in  $B$ , the larger per capita income in  $A$  will be more than offset by the larger number of sharers in  $B$ , and migration from  $A$  to  $B$  will occur. The possibility of multiple equilibrium in this and in subsequent models should be acknowledged. We suggest however, that the assumptions generating migration to the wealthier state are more reasonable than those generating migration to the poorer state.

<sup>18</sup> The possibility of increasing returns over the initial ranges of population growth cannot be excluded, but our abstraction from this possibility does not affect the analysis so long as actual population levels lie beyond any possible range of increasing returns.

FIGURE 2



*B* to *A*. This equilibrium is attained when the marginal private-product value plus the *average* public-product value is the same in the two states. The position reached by individuals making their own migration decisions will not be Pareto optimal. Optimality would require that resources shift to the point where marginal private-product value plus *marginal* public-product value are identical in the two states. Individuals “should” migrate from *B* to *A* so long as the marginal loss in private-product value is less than the marginal gain in public-product value. In the construction of Figure 2, Pareto optimality or efficiency would require a total population shift from *B* to *A* of  $A_2 - A_0 = B_0 - B_2$ . This position could be attained only if property rights could somehow be assigned in public-product values. The establishment of a set of property rights would permit states to set prices upon and require the purchase of the right to migrate to that state. In terms of our illustration, state *A* could offer subsidies to individuals to migrate from *B* which *B* could not match until the  $A_2, B_2$  population distribution is reached. Since such property rights do not exist, and probably would not be desirable if they could be established, individual choices must be analyzed in terms of responses to differentials in average public-product values.<sup>19</sup>

<sup>19</sup> This model is only one among many conceptually interesting and often policy-relevant institutional settings that require an analysis of individual response to differentials in average rather than marginal values. For a closely

In this Ricardian model in which states provide purely public goods, there will be too little migration from the poorer state *B* to the richer state *A*. There is no efficiency argument for fiscal equalization here. In fact, an efficiency case can be made out for disequalizing transfers from the poorer state to the richer state so as to induce additional migration sufficient to attain full Pareto optimality in resource location in space. This policy would be based on an acknowledgement that people are allowed to choose on the basis of average rather than marginal public-product values, with the change in the results generated by a modification in the levels of these average values themselves.

### III. Impurely Public Goods under State Provision in a Federalism

Initially, we assumed full resource mobility along with state provision of purely public goods. In the last part of Section II, we dropped the mobility assumption of the model. In this section, we relax the other restrictive assumption, that of purity in the public good. When we introduce impurely public goods, one production unit no longer embodies an unlimited quantity of consumption units in an area. Each production unit does, however, embody more than one consumption unit, so long as we are not all the way to the other pole, the purely private good. For the impurely public good, given any fixed-size public facility, the addition of one person to a beneficiary group reduces the quantity of consumption units available to other members, although the correspondence is not normally one-to-one. This amounts to saying that as population increases in any given region or area, congestion in the usage of the publicly supplied good sets in ultimately and, as a result, individual evaluations of the commonly shared facilities fall.<sup>20</sup>

related discussion, even if on a different problem, see Leland B. Yeager, "Immigration, Trade, and Factor Price Equalization," *Current Economic Comment*, Vol. 20, August 1958, pp. 3-8. In this paper, Yeager shows that despite the analytical similarities between trade and immigration, they differ precisely because immigration normally allows sharing in socially-created values that are not directly related to the marginal productivities of the in-migrants. Trade, of course, does not involve this sort of sharing.

<sup>20</sup> Complex problems of measurement arise in the model with impurely public goods. Conceptually, it is possible to measure the benefit flows to individuals in physical units, but it is relatively easy to confuse changes in physical service flows with changes in individuals' evaluations of fixed quantity flows.

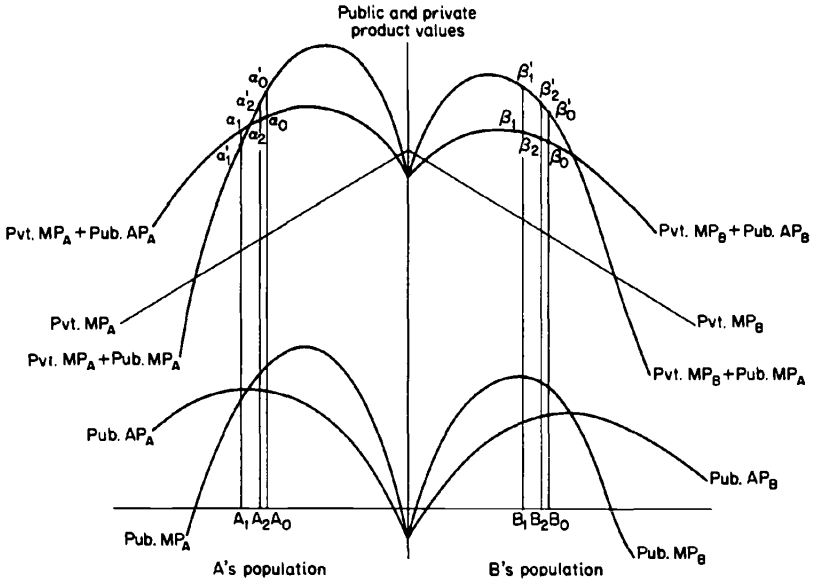
The introduction of impurely public goods significantly modifies our previous analysis. The private-product value curves of Figure 2 remain unchanged, so long as we remain in the Ricardian model, but the fiscal surplus or public-product value curves take on quite different configurations. The tax component is unchanged; the tax-price confronted by the individual declines as the size of the sharing group is increased. The change here comes from the benefit side of the account. Individual evaluation curves for the state-supplied good take on different shapes. With purely public goods, these evaluations remained unaffected by the size of the group.<sup>21</sup> When impurity is introduced, individual evaluations of the public good decline with the size of the group once the point of initial congestion is passed. Under the most reasonable assumptions, it seems likely that this decline will be at an increasing rate; successive doublings in the size of the sharing group will tend to yield successively increasing reductions in individual evaluations. In terms of our geometry, this implies that the fiscal surplus or public-product curves no longer rise continually over group size. They will now decline from the point where the negative effects from congestion of the facilities offset the positive effects of the tax-price reductions. The optimality of individual migration decisions under these modified conditions can now be examined.

### *Social Consequences of Individual Migration Adjustment*

Individual choice behavior will generate nonoptimal results in this model under the most plausible set of assumptions. In making their private decisions concerning migration, individuals will not take into account the effects of their behavior on others. In this sense, the model is similar to the one previously analyzed; individuals adjust to average rather than marginal fiscal product. The direction or pattern in which the private-equilibrium adjustment equilibrium departs from Pareto optimality may, however, be different in this model. With purely public goods in the Ricardian model, migration to the richer region tends to be less than optimal because individuals do not incorporate the tax-price reductions that their migration generates for other members of the

<sup>21</sup> Indirectly, through changes in the quantity supplied, the individual marginal evaluations may be affected by changes in group size, even in the purely public goods case. For any given quantity, defined in production units, however, the size of the sharing group does not influence the individual's marginal evaluation.

FIGURE 3



wealthy-state sharing group. With impurely public goods, this effect remains, but it may well be dominated by a second. Individuals will fail to take into account in their decisions the effects that their actions exert on others due to congestion of the publicly supplied facilities. With purely public goods, the individual in-migrant to the richer state exerts an external economy on residents of that state and an external diseconomy on residents of the state which he leaves. With impurely public goods, these tax-side externalities may be swamped and reversed by benefit-side externalities.

Figure 3 incorporates the changes that are required by the introduction of impurity in the public good. As drawn, the socially optimal amount of migration is  $A_2 - A_0 = B_0 - B_2$ , where the summed marginal values of private and public goods are equal in the two states and both are in the declining range. Individual adjustments will, however, lead to an excessive migration, indicated by  $A_1 - A_0 = B_0 - B_1$ .<sup>22</sup>

<sup>22</sup> In this Ricardian model, even with the impure public goods, it is possible that private adjustment will generate a position in the range of increasing marginal public-product value curves. If over-all population levels were sufficiently small to permit this, marginal public-product values would exceed average public-product values, and the analysis of Figure 2 would hold. If population

The situation here is generally equivalent to that discussed by Pigou and Knight in terms of the now-classical crowded good road-uncrowded bad road illustration.<sup>23</sup> Knight showed that individual choice behavior leads to too much traffic on the good road and too little on the bad road only in the absence of established property rights in the good road. Knight's emphasis was that of demonstrating the social function of property rights in allocating scarce resources. The problem that we examine in this paper is fully equivalent to the road illustration. The excessive migration generated by private choice can be mitigated by the granting of property rights to residents of subordinate units of government in the federalism. Practically, this would amount to allowing such political communities the right of excluding in-migrants. Individuals then wishing to migrate would be forced to purchase these rights. Conceptually, this set of institutions would be possible, but, even should the competition among the several states be sufficiently intense, the implied limitations on individuals' freedom of movement seem inimical to the functional values of Western civilization. For this reason, we simply rule out any further consideration of schemes designed to allow states directly to exclude immigrants as a means of correcting spatial resource inefficiencies.

levels are sufficient to allow the declining range of public-product values to be reached, however, the privately-determined equilibrium involves an excessive shift of resources into the richer areas. Detailed discussion is limited to this case, which seems the more meaningful in the modern federal setting, especially in the United States.

For completeness, the analysis which assumes full mobility but which incorporates the impurely public good can be briefly discussed with the construction of Figure 3. In this case, curves for marginal private-product value are unaffected by population shifts, and would assume the shape of those in Figure 1. Optimal migration levels are indicated by the points where marginal public-product values are equal in both states. But individual adjustment would generate migration to the points where average public-product values are equal, which would imply, of course, excessive migration to the wealthier state, *A*.

<sup>23</sup> The issues are most clearly defined in Frank H. Knight, "Some Fallacies in the Interpretation of Social Cost," *Quarterly Journal of Economics*, Vol. 38, 1924, pp. 582-606, originally written as a comment on A. C. Pigou's, *The Economics of Welfare*, London, 1918.

In an important recent paper that, unfortunately, is not known to English-language readers, Francesco Forte discussed the problem of internal migration, with especial reference to the south-north Italian population shifts, in the Pigovian framework. Forte specifically relates his analysis to the Pigou-Knight good road-bad road discussion. See Francesco Forte, "Le migrazioni interne come problema di economia del benessere," *Studi Economici*, Vol. 17, March-June 1962, pp. 97-124.



*Fiscal Equalization as a Substitute for Exclusion Rights*

Under the conditions discussed, too many people will migrate to the wealthier political subdivisions of the federalism. National income, appropriately measured to include valuations on public goods, would be higher if the excessive resource shifts could somehow be prevented. Since property-exclusion rights are ruled out as a relevant policy alternative, optimality requires some other institutional means of eliminating the sources for the excessive population flows. This suggests that some means should be found for reducing the fiscal surplus differentials so that individuals in their responses to average differentials will be induced to promote the same outcome that would emerge under their conceptual response to marginal surplus differentials. With reference to Figure 3, this might be achieved if the curve for average public-product value in state *A* is shifted downward while the curve for average public-product value in state *B* is shifted upward, such that the sum of private marginal product and public average product becomes equal between *A* and *B* at population levels  $A_2$  and  $B_2$ . Under these modified conditions, rational individual choice of locations would generate collectively efficient allocations of population.

The institutional embodiment of the process described here is, of course, a transfer of funds from state *A* to state *B*, an equalizing grant. After a grant of the appropriate magnitude, state *B* will be able, at identical rates of tax, to provide a larger quantity of the public good than before, and state *A* will be able to provide a smaller quantity than before. A partial equalization of fiscal capacities will have taken place.<sup>24</sup>

As our analysis demonstrates, the transfer suggested will be Pareto optimal. Fiscal equalization of the sort described will be to the advantage of citizens of *all* regions. The analysis also indicates that the formula for making the interarea transfers should be based on some appropriate measurement of optimal-sized sharing units. This suggests, in turn, that the size of the required transfers should be directly related to the goods, services, facilities, and "atmosphere" generally that are to

<sup>24</sup> Full equalization of fiscal capacities, defined in terms of fiscal surplus differentials, would eliminate resource flows entirely, and would be clearly non-optimal. In Pareto-optimal conditions, the individual who remains in state *B*, the poorer of the two in our model, earns a somewhat higher private income and enjoys the benefits of somewhat less congested public facilities than his equal in state *A*. These two advantages are, however, offset by the fact that he must pay a somewhat higher tax-price for the units of public good that he does receive.

be commonly shared. If state-local units provide many goods and services that are quantitatively important, the efficiency distortions generated by uncorrected private choice behavior will be greater than in the case where state-local units are less active fiscally. Increasing collectivization at the state-local level in a federalism enhances the efficiency basis for making equalizing fiscal transfers.<sup>25</sup>

There are two characteristics of an optimal equalization program that warrant mention. First, the type of transfer indicated is not, even conceptually, one among individuals but instead is among *collectivities* of individuals. The source of the excessive migration lies in the provision of public goods, which are not fully divisible among persons; corrective measures must work through a similar process.<sup>26</sup> Second, the system of optimal equalizing transfers would be zero sum or purely redistributive as among separate states. No net budgetary activity by the central government would be required.<sup>27</sup>

### *Inefficiency in State Provision of Public Goods*

To this point we have deliberately ignored those problems that might be raised by distributional differences among the fiscal structures of the state governments. In one sense this introduces a secondary set of issues, and these should not be allowed to distract attention from the central analysis presented above. In the latter, differential fiscal surpluses generate population movement even when all states provide public goods efficiently; that is, when all persons in each state pay marginal tax-

<sup>25</sup> We have wholly neglected central government provision of public goods and services in our analysis. If the central government provides goods and services directly over the whole national economy, whether these be pure or impure, some divorce of the central government tax structure from a measured money income base is indicated in any Ricardian model. Since one of the necessary equilibrating adjustments is in the levels of money earnings for like resource units that are differently located, central government tax adjustments should take this into account. If this proves to be impracticable, as seems to be the case, an additional, if limited, argument for equalizing transfers to the poorer states is provided.

<sup>26</sup> This represents a different formulation for equalizing transfers from Buchanan's early proposals which, ideally, called for transfers among individual citizens differently located. See "Federalism and Fiscal Equity," *op. cit.*

<sup>27</sup> This is similar to the West German system for fiscal equalization. This is one of zero-sum transfers, but the effects are secured through variations in the amount of tax collections that each state returns to the federal government. For a recent description, see Emilio Gerelli, "Intergovernmental Financial Relations: The Case of the German Federal Republic," *Weltwirtschaftliches Archiv*, Vol. 97, 1966, pp. 273-302.

prices equal to their marginal evaluations of the public goods provided. States probably come much closer to satisfying these extreme efficiency norms than central governments; income-wealth redistribution as an objective explicitly divorced from allocative goals cannot readily be sought by states in a federal system. Nevertheless, states may embody departures from neutrality in their fiscal structures, and it will be useful to examine the effects on the results of our earlier analysis.

Initially, we assume that, even if state-local fiscal systems embody net redistribution at the margins of public-goods provision, the aggregative marginal conditions for efficiency remain satisfied for each state. That is, the summation of marginal tax-prices equals the summation of individual marginal evaluations, but the "rich" pay marginal tax-prices in excess of their own marginal evaluations while the "poor" pay marginal tax-prices offsettingly lower than their marginal evaluations. In this setting, insofar as the separate states attempt roughly the same degree of marginal redistribution, the previous analysis is not significantly modified. All resource owners in states of below-average incomes will have a fiscal incentive to migrate.

The introduction of marginal redistribution becomes important for our purposes only when the separate states differ substantially one from another concerning the amount and direction. Assume, for example, that an above-average-income state tries to accomplish more net income redistribution than its below-average-income counterpart. For a convenient illustration, suppose that California increases its rate of income tax progression to finance an increase in welfare payments. This change will increase the fiscal pressures felt by high-income groups and reduce the fiscal pressures felt by lower-income groups. The effect will be to alter the structure of migration from lower-income states to California in the direction of increasing the proportion of lower-income migrants.

By contrast, if a below-average state attempts to accomplish greater net redistribution than its higher-income counterparts, the initial disparity in income levels will be aggravated by the patterns of migration that this change will produce. A greater proportion of higher-income groups will migrate out, and the remaining population will be changed in the direction of more lower-income earners.

When departures from optimality in the over-all quantity of public goods are introduced (when the aggregative marginal conditions are no longer satisfied), the results depend critically on the effects of the attempted redistribution at the margin on the position of the taxpayer-beneficiaries in the median income ranges. Spending programs may be

above or below optimal levels, depending on the coalition structure that is decisive in collective choices and upon the tax institutions that are utilized. If spending programs are reduced below optimal levels, the effects on migration discussed in our general models tend to be less significant; if spending programs are increased above optimal levels, the effects on migration tend to be more significant.

#### IV. Some Policy Implications

Policy implications have been implicit in the preceding analysis, but it will be useful to discuss these more directly. To the extent that the conditions of the central model are at all descriptive of real-world institutions, an efficiency basis exists for making equalizing fiscal transfers in a federalism. The potential real-world relevance is clear from the simple logic of the analysis; individuals make migrational choices on the basis of marginal private values and *average* public values because of the absence of enforceable property rights in the latter. Only if this essential fact can somehow be denied would the analysis lose its potential relevance. The actual relevance, of course, is an empirical matter that depends upon current congestion levels and interstate population levels. Empirical relevance requires that the largest populations not reside in the poorer states; this requirement is clearly fulfilled. Furthermore, the observed congestion of existing public facilities in areas of population concentration also supports the applicability of the central model in the United States of the late 1960's and 1970's. The argument strongly suggests the desirability of initiating equalizing fiscal transfers aimed at offsetting to some degree the differentials in fiscal surplus that privately motivate excessive resource concentration in space.<sup>28</sup> At current margins of decision, there is likely to be a greater return per dollar invested in keeping a family in Arkansas than in helping Chicago finance a part of the external costs that this family's migration might impose on current Illinois residents.

<sup>28</sup> Although our analysis has been posed in terms of the efficiency of equalizing *interstate* transfers, it is equally applicable to the efficiency of equalizing *intrastate* transfers.

The general problem that we have examined has also been examined recently by Koichi Mera. He, however, failed to escape the shackles of the purely private goods orthodoxy, so his analysis was irrelevant for the major issues. See "Trade-off Between Aggregate Efficiency and Inter-regional Equity: A Static Analysis," *Quarterly Journal of Economics*, Vol. 81, November 1967, pp. 658-74.

Perhaps the most significant policy implications currently are negative. The central argument provides a warning against relying too heavily upon the use of massive central government grants to urbanized areas in attempting to improve the urban environment. Such a policy of grants can aggravate existing allocative distortions by providing still further fiscal incentives for individual migration to the high-income, urbanized sectors.<sup>29</sup> The spatial pattern of population distribution that satisfies Pareto-efficiency requirements, including efficiency in the utilization of public goods (including "atmosphere"), surely dictates some slowing down of the continuing flow of population into the areas where public facilities seem currently to be congested. This seems clearly to be an important, and much neglected, problem where individual or private responses to market forces generate socially inefficient outcomes.<sup>30</sup>

<sup>29</sup> Any detailed discussion would, of course, have to take into account the different migration patterns for different income groups. But the potential relevance of our analysis can be sufficiently demonstrated by imagining that, through some political "miracle," the cities of the United States were to be suddenly transformed into the crime-free, pollution-free, amenities-bountiful "paradises" envisaged in some of the current discussion. Unless this policy would be accompanied by some limitation on migration, congestion would soon reemerge with little net improvement over the existing situation.

The whole problem here is, of course, identical to the attempt to relieve traffic congestion by the continual construction of larger and better superhighways. Private decisions will insure that traffic flows will ultimately increase to the level of the improved highway capacity and beyond. Economists make vigorous policy proposals in the highway-street case, and they have normally suggested that efficient outcomes can be secured by pricing scarce space in accordance with standard marginal-cost criteria. The full efficiency of this pricing mechanism may be questioned, even in the highway model, and, with the movement of population over space, direct pricing solutions seem to be neither feasible nor desirable.

<sup>30</sup> Another policy implication is that attempts to redistribute income in kind through an increased provision of various social services are likely to be significantly dissipated through the additional in-migration induced by their provision.

## COMMENT

by MARTIN S. FELDSTEIN, *Harvard University*

The paper by Buchanan and Wagner is both stimulating and provocative. It presents an analytic discussion of an important policy issue—the role of federal grants to state and local governments. While previous treatments of this subject have dealt with it in terms of equity, fiscal capacity, and tax competitiveness, Buchanan and Wagner concentrate on the efficiency aspect of the problem. Although I now believe that its primary conclusions are wrong and that the analysis is incorrect in several places, I would nevertheless defend the usefulness of the paper in focusing our attention on the implications of population migration for the efficiency of public goods provision and intergovernmental grants.

The authors consider two basic models: pure public goods and impure public goods. Although they briefly consider a fixed cost model, attention is primarily on the Ricardian model in which land is a fixed factor and increased population lowers the marginal product of labor. Their basic conclusion is that in a world of pure public goods there would be too little migration while, in a world of impure public goods, migration would be excessive. I shall show that the first conclusion comes from an incorrect treatment of a pecuniary benefit as if it were a real benefit. The second conclusion depends on the very special case which the authors treat. In general, neither conclusion is correct.

Let me first summarize their discussion of the pure public goods case. In the model which they consider, two states are providing public goods of the same fixed size. Land is a fixed factor while labor is mobile; increasing the labor-land ratio decreases the marginal product of labor. In State *A*, per capita income is higher, the population is larger, and the individual's tax payments are "therefore" lower than in State *B*.<sup>1</sup>

<sup>1</sup> The reason for lower per capita taxes in the richer state is not clear from the paper. At one point the authors use a model in which: (1) each citizen pays a tax-price equal to his own marginal evaluation of the public good; (2) the size of the good is determined by the requirement that the sum of the marginal evaluations equals the marginal cost of the good; (3) neutral taxes and transfers correct any deficit or surplus; and (4) the income elasticity of demand for public goods is positive. These assumptions imply that an individual with a given income will pay a lower tax *per unit of the public good* if he lives in the richer state. However, the total tax paid by the individual might be higher

When an individual migrates from *B* to *A*, he "benefits" the individuals in State *A* by lowering the tax rate which they pay. Because there are only pure public goods, there is no congestion effect lowering the benefit of the public good to the previous residents of State *A*. But the potential migrant does not consider his effect on the tax level in State *A*; his decision is based on his private marginal benefits and costs. Individuals therefore continue to migrate from *B* to *A* until the difference between the tax rate in the two areas balances the higher private productivity of labor in Area *B*. At this equilibrium point, the residents of State *A* would still like more inward migration because this lowers their taxes. Because the potential migrant cannot internalize this, he does not move. Buchanan and Wagner therefore conclude that the amount of migration is *less* than Paretian-optimal.

I don't find this analysis convincing. In fact, I come to the opposite conclusion: under the Buchanan-Wagner assumption about tax sharing there will be too much migration in the pure public goods case. I reason that since the quantity of public goods to be produced in the two states is fixed and the goods are pure public goods, the requirement for Paretian optimality is that the population be divided between the two states in such a way that the marginal product of labor is the same in both states. If the land area is the same in both states, this calls for an even division of the population; i.e., no migration. I see no rationale for taking into account the transfer mechanisms by which the provision of public goods in the two states is financed. The "benefit" conferred by the migrants is purely a pecuniary benefit while the cost they confer is real. If I am right in concluding that Paretian optimality requires no migration in the pure public goods case, and if Buchanan and Wagner are right in saying that a positive determinate amount of migration would be induced, then even in this pure public goods case there is reason for federal grants to the areas from which migrants are coming.

The issues raised by "impure" public goods are of greater policy significance. The primary conclusion reached by Buchanan and Wagner

if he lived in the richer state. In the context of this model, the reason for migration to richer states is not that the taxes are lower but that consumer surplus is higher.

A few paragraphs later, the basic model is changed. Now the public good is assumed to be of fixed size and there is equal per capita sharing of the costs of the public goods. But while it is obviously true that the per capita tax cost falls under this scheme as more people enter an area, it is no longer clear that more individuals will be attracted to the richer area under the equal cost-sharing arrangement.

is that the presence of impure public goods induces more migration from poorer states to richer states than would be economically efficient. A person entering the richer state reduces the benefits that the previous residents obtained from the impure public goods. In more concrete terms, he adds to the congestion in their use. The social marginal cost of his migration is greater than his private marginal cost, or, as Buchanan and Wagner prefer to state it, than the social average cost which the migrant pays. It is this divergence between social and private marginal costs that causes the "excess" migration. Although there is some validity in this analysis, the conclusion is wrong. While the divergence between social and private marginal cost does imply that the final distribution of population will probably not be socially optimal, the conclusion that there is *excess* migration from poor to rich areas is based on a number of very special assumptions in the Buchanan-Wagner analysis. For example, if we drop the obviously artificial assumption that the two states are originally of equal size and with equal population, it is quite possible that there is too little migration. One need only think of migration from a small, poor area to a rich large area; the external decongestion benefits of leaving the former may outweigh the congestion costs imposed in the larger. The Buchanan-Wagner conclusion can also be reversed by relaxing the assumption that the public goods are of the same size in both states and recognizing that there may be economies of scale in producing the public good. Perhaps most important, we must recognize that people who live in cities have different *preferences* with respect to congestion than those who live in rural areas. This implies that the relative welfare significance of migration between the two places cannot be evaluated by a simple head-count measure of congestion. In short, one cannot say in general that the presence of impure public goods causes excess migration from poor to rich areas.<sup>2</sup>

Let me now return to the policy recommendations that Buchanan and Wagner derive from their analysis of the impure public goods case. They conclude that, on grounds of efficiency, federal equalizing grants should be paid to poorer areas but that "massive central government grants to urbanized areas . . . can [only] aggravate existing allocative distortions" (p. 158). In addition to the problems in their analysis which I have already discussed, their implied advice not to give federal

<sup>2</sup> The authors also introduce the false benefits of per capita tax reduction in their analysis of the Paretian efficiency of migration in the presence of impure public goods. Just as in the pure public goods case, a correct treatment would ignore these pecuniary benefits.



grants to the cities ignores three primary aspects of the fiscal problem facing urban areas. First, there is the obvious fact that it is to very poor areas and to those with predominantly Negro populations, that much of the proposed aid would be directed. Although these are areas of high population density, this is clearly not because of the lavish provision of public goods! Considerations of equity, and perhaps of long-run efficiency, imply public programs far in excess of the financial capacity of the local urban areas. Second, intercity tax competition keeps the level of spending in urban areas below the level that would be chosen collectively. Federal action is necessary to achieve a Paretian optimal level of expenditure and taxation by the cities. Finally, the cities are part of larger metropolitan areas to which they provide public good services but from which it is difficult to obtain revenues. Without support to the cities, the level of public good provision to the entire metropolitan area will be too low. A combination of high tax rates in the central city and the opportunity for residents of neighboring suburbs to enjoy the goods provided by the city would only accelerate migration to the suburbs and exacerbate the fiscal difficulties that the cities face today.