Approaches to A Fiscal Theory of Political Federalism

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THE preceding paper deals with the fiscal structure of a community as determined by considerations of economic efficiency.[1] These considerations demanded central provision for services the benefits of which accrue equally throughout the federation, while leaving the supply of other services to various regional units of government. This study is concerned with a quite different approach, where the role of the central fisc is not limited to considerations of efficiency, but set by the very objectives of political federalism. When independent states join in a federation, they may do so to develop a common foreign defense, or establish a customs union, or they may wish to pursue certain objectives which require central government interference in the finances of the member states.[2] It is this interference which is the subject of this paper.

Central interference in state finances may be based on various objectives. One set of objectives relates the central fisc to the *groups of individuals* comprising the various states. Here the central fisc respects the determination of fiscal policies at the state level, and leaves the individual citizen of the federation at the fiscal mercy of the political process in which he partakes as a citizen of his particular state. However, the central fisc may influence the terms at which public services are provided at the state level. Thus, it may choose to equalize the fiscal operations of the various states, where equalization may be defined in a number of ways. Or, the objective might be to provide incentives to states to raise their service levels. Finally, central policy may wish to assure a minimum level of state services, independent of self-finance by the states.

Another set of objectives relates the central fisc to the *individual citizens* of the federation, whatever the particular state to which they

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[1] See C. M. Tiebout's "An Economic Theory of Fiscal Decentralization," in this volume.

[2] The terms "central" and "state" are used here in a generic sense of reflecting higher and lower levels of government.

belong. Here the central fisc may try to equalize differentials in the position of federal citizens which arise from their respective citizenships in particular states. Thereby the central fisc attempts to isolate federal citizens from the fiscal consequences of their respective state citizenships. As such, this approach is less federalist and more centralist in spirit than the preceding view, wherein the central fisc deals with the states as political entities.

The final choice among these approaches, and among various forms of each, is a matter of political philosophy rather than economics. However, the various plans differ in their economic consequences. My purpose is to explore these differences, especially as they apply to various interpretations of the first approach. The second approach will be considered but briefly.

1. Plans Relating Central Fisc to Member States of Federation

Plans involving relationships between the central fisc and the political units of the various states will be considered first. Here it is the purpose of the central fisc to influence the fiscal performance of the various states. The objective may be to bring about various forms of equalization, be it in actual performance, in fiscal capacity, or in fiscal potential; or the objective may be to induce the states as a group to raise their service levels.

The various plans will be examined as to their distributional results and their incentive or disincentive effects on state services. To make this a meaningful investigation, each case must allow for such central taxes or transfers as may be needed to finance the plan and to clear the central budget. This budget equation appears to have been overlooked in most discussions of such plans and is the crux of our analysis. The following symbols will be used:

n = number of states
T_i = taxes collected by the i^{th} state, in dollars
S_i = subsidy (+ or −) received by the i^{th} state, in dollars
A_i = total dollar outlay by the i^{th} state
P_i = level of performance in the i^{th} state
N_i = index of need in the i^{th} state
t_i = tax rate in the i^{th} state
t_c = tax (+) or subsidy (−) rate of central government, required to clear the central budget
t_s = standard rate
B_i = tax base of i^{th} state
m = minimum outlay per unit of need
k = rate of matching grant
K = lump sum grant, in dollars
Use of bars indicates averages.

To simplify matters, these rather heroic assumptions are made:

1. There is only one type of state service.
2. Taxes collected by any one state are in fact borne by the citizens of that state. This rules out the possibility of exporting tax burden, or shifting taxes to the citizens of other states.
3. Benefits from expenditures in any one state are limited to citizens of that state. This rules out spillover of benefits.
4. All state expenditures are tax financed. This rules out borrowing.
5. A full-employment income prevails. This rules out problems which arise from cyclical fluctuations.
6. Changes in policy of any one state will not lead to retaliatory measures by other states. This rules out strategy.

These assumptions will be reconsidered briefly later on.

PURE EQUALIZATION PLANS:

A. Equalization of Actual Outlay or Performance

PLAN 1. A first and rather primitive approach to equalization is one where the central government equalizes actual per capita dollar outlays on state services in all states. In other words, it taxes away the above-average revenue from high-revenue states, and pays transfers to meet the deficiency in low-revenue states.

The definitional equation is:

$$A_i = T_i + S_i \qquad i = 1, 2, \ldots, n, \tag{1-1}$$

one such equation being given for each of the n states. Since it is the object of central government policy to equalize the outlay A_i in all the states, it must meet the condition:

$$A_i = \frac{\Sigma_i A_i}{n} \text{ arises.} \tag{1-2}$$

Finally the central budget must be balanced, so that

$$\Sigma_i S_i = 0. \tag{1-3}$$

This leaves $n + (n - 1) + 1 = 2n$ equations. Given the T_i's, all A_i's and all S_i's can be determined.

The S_i's represent a subsidy from the central government if they are positive, and a charge if they are negative.

Obviously, $S_i > 0$ if $T_i < \frac{\Sigma_i T_i}{n} = \bar{T}$; also

$S_i = 0$ if $T_i = \bar{T}$; and

$S_i < 0$ if $T_i > \bar{T}$.

The plan results in a redistribution from states whose tax yield exceeds the national average to states whose tax yield falls short of the average.

Summing the n equations under (1-1), solving the system for S_i and taking a partial derivative with respect to an autonomous change in taxation by the state i,[3] gives the following:

$$\frac{\partial S_i}{\partial T_i} = \frac{1}{n} - 1. \tag{1-4}$$

The partial derivative is negative, so that an increase in the tax yield of any state getting a subsidy reduces that subsidy, part of the yield being drained off to other states.

Effects of changes in the state's tax yield on its total outlays are obtained by solving for A_i and taking the partial derivative with regard to T_i. The result is:

$$\frac{\partial A_i}{\partial T_i} = \frac{1}{n}. \tag{1-5}$$

Since n represents the number of states, $1/n$ is always a fraction. The partial derivative falls short of one so that the substitution effect imposes a disincentive to state taxation. State i only retains a fraction of its own yield and the own-cost of state services is increased. If the number of states is large, $1/n$ becomes very small and the benefit to any one state from increased taxation approaches zero. Thus, this system has an extreme disincentive effect on state taxation. All states will reduce their own revenue, and the system may tend towards a zero level of taxation.[4]

PLAN 2. Quite apart from its extreme disincentive effects, Plan 1 is unsatisfactory because there is no allowance for differences in the needs of various states. Equal dollar outlays may result in great differences in performance levels; and if public policy is to aim at equalization of actual levels of some sort, it will be more meaningful to equalize performance levels. This is done in Plan 2.

Two sets of definitional equations apply:

$$A_i = T_i + S_i, \qquad i = 1, 2, \ldots, n; \tag{2-1}$$

$$P_i = \frac{T_i + S_i}{N_i} \tag{2-2}$$

[3] Summing (1-1) gives $\Sigma_i A_i = \Sigma_i T_i + \Sigma_i S_i$, and substituting from (1-3) gives $\Sigma_i A_i = \Sigma_i T_i$, or $n\bar{A} = \Sigma_i T_i$, or $\bar{A} = \frac{\Sigma_i T_i}{n}$. Since by (1-2) it is known that $A_i = \bar{A}$, this can be substituted in (1-1) to obtain $S_i = \frac{\Sigma_i T_i}{n} - T_i$, from which (1-4) follows.

[4] In addition to this substitution effect, gaining states may increase their taxation due to income effect, while losing states may reduce theirs, but these effects will tend to wash out on balance.

where A_i, T_i, and S_i are defined as before. P_i is the performance level of the state i and equals the ratio of outlays in state i to the index of need for state i.[5] The index N_i may be standardized so that

$$\bar{N} = \frac{\Sigma_i N_i}{n} = 1$$

Thus, a state with an index $N_i = 1$ has needs equal to the average for all states in the country. If $N_i > 1$, the state is needier than the average, and if $N_i < 1$, the state is less needy.

As before, it is assumed that the central government pursues a policy such that its proceeds from and disbursements to the states are balanced, or

(2-3) $$\Sigma_i S_i = 0.$$

The purpose of these central subsidies and taxes is to equalize performance levels in all states, so that

(2-4) $$P_i = \frac{\Sigma_i P_i}{n}.$$

Considering T_i's and N_i's as given, there are $n + n + 1 + (n - 1) = 3n$ equations. Thus, all A_i's, S_i's, and P_i's can be determined.

As may be seen from equation (2-2)

$$S_i \gtreqless 0 \quad \text{if} \quad P_i \cdot N_i - T_i \gtreqless 0.$$

The redistribution now is from low need-high tax yield to high need-low tax yield states. A state which is average in both respects remains unaffected, as are states which combine proper degrees of excess or deficiency on both counts.

As before, the (2-1) equations can be summed, the system solved for S_i, and a partial derivative with regard to T_i taken.[6] The result is:

(2-5) $$\frac{\partial S_i}{\partial T_i} = \frac{N_i - n}{n}.$$

Since $\frac{\Sigma_i N_i}{n} = 1$, the derivative is negative. An increase in the tax

[5] If public services are in the form of education, N may be an index of school-age children. In the case of highways it may be an index of traffic needs, e.g., dispersion of population and so forth. Construction of appropriate indices for all services creates difficult though not insurmountable problems.

[6] From equation (2-2) comes $P_i N_i = T_i + S_i$. Summing and substituting from (2-3) gives $\Sigma_i P_i N_i = \Sigma_i T_i$, or $P_i = \frac{\Sigma_i T_i}{n}$. Substituting into (2-2), we get $S_i = \frac{\Sigma_i T_i N_i}{n} - T_i$, from which (2-5) follows.

yield of any one state always reduces its subsidy, the loss being smaller the larger is the state's need.

In order to determine the effects of changes in a state's tax yield on its total outlays, the system is solved for A_i and a partial derivative with regard to T_i taken to obtain:

$$\frac{\partial A_i}{\partial T_i} = \frac{N_i}{n}. \tag{2-6}$$

Since the partial derivative is a fraction, the substitution effect always imposes a disincentive to state taxation. For the average state, where $N_i = 1$, the disincentive is the same as under Plan 1. It is smaller for more needy states and greater for less needy states. As before, the system tends toward a zero level of taxation.[7]

PURE EQUALIZATION PLANS:

B. Equalization of Differentials in Need and Capacity

Next, the central fisc may wish to equalize differentials in fiscal capacity, rather than in actual outlays or performance.

PLAN 3. The yield or performance level which the states themselves choose to provide is now disregarded and attention focused on their ability to provide for a centrally set level of performance. The two definitional equations are:

$$A_i = T_i + S_i \qquad i = 1, 2, \ldots, n, \tag{3-1}$$

$$S_i = m(N_i - \bar{N}) + t_s(\bar{B} - B_i). \tag{3-2}$$

Equation (3-2) defines the subsidy to any one state in two parts. The first is the deficiency in yield, obtained by applying a standard rate in state i, as compared to what is obtained by applying it in the average state; and the second part is the excess of expenditure required to give a set performance level m, as compared to the amount required in the average state. Each part of the subsidy will equal zero for the group as a whole, so that the central budget will balance. Such is the case at whatever levels t_s and m are set, but it is reasonable to assume that

$$t_s\bar{B} = m\bar{N} \tag{3-3}$$

so that the standard rate provides the required revenue for a state of average base and need. Given m and the values of T_i, N_i, B_i, as well as $\bar{N}$ and $\bar{B}$, the system can be solved for the values of A_i, S_i, and t_s.

[7] With regard to income effects, the same observations apply as to Plan 1.

Setting $\bar{N} = 1$ as before, and substituting, the result is

(3-4) $$S_i = t_s(\bar{B}N_i - B_i).$$

Redistribution is from low need-high base, to high need-low base states.

This approach may also be looked upon as providing for a block grant, adjusted to need so as to assure an equal level of performance, and financed by a proportional central tax t_c. Thus, in place of (3-2)

(3-2a) $$S_i = mN_i - t_cB_i \quad \text{and}$$

(3-3a) $$m\bar{N} = t_c\bar{B} \quad \text{can be written,}$$

from which an expression similar to (3-4) may be obtained.

Written in either form, the essential feature of this plan is that t_i, the state's own tax rate, does not appear. Therefore, the plan has no substitution effect. This is a great advantage as compared to Plans 1 or 2, where the disincentive effect was of prohibitive magnitude. However, Plan 3 still retains the disadvantage that no allowance is made for the state's own tax effort. Thus, state X may be forced to contribute to public services in state Y, even though the residents of Y fail to make even a modest effort to meet their own problems. This, the residents of state X will rightly object to.

PURE EQUALIZATION PLANS:

C. Equalization of Potentials for State Finance

This disadvantage can now be removed and a more sophisticated approach considered, where the function of the central fisc is not to equalize actual levels or capacities in the various states, but to equalize fiscal potentials. Underlying this approach is a philosophy of fiscal federalism which says that the societies of each state should be permitted to determine their own levels of fiscal activity, but that the central government should equalize the fiscal opportunities of the various states, or the potential levels which they might achieve with their own action.

PLAN 4. A first variant of this approach is equalization of fiscal capacities, in the sense of equalizing the tax revenue which various states might obtain by imposing any given rate of tax. To simplify, this rate is here defined as the ratio of state revenue to the tax base of the state. The tax base, in turn, may be defined as private income in the state.[8] Differences in need are disregarded for the time being.

[8] The question whether property as well as income should be allowed for in measuring the tax base is not here entered into. For the present purposes, the simple definition of the tax base in terms of income will do.

Under this plan each state will obtain a subsidy or pay a tax equal to the difference between the revenue which would be obtained if its tax rate was applied to the average tax base, and the revenue which *is* obtained by applying its tax to its own base. If the claims of small-base states exceed the contributions of large-base states, a further central tax is needed to clear the budget, and a further central transfer is required if contributions exceed claims. It is assumed that this central tax or transfer is assessed proportional to state income.[9]

Proceeding as before, two sets of definitional equations arise:

$$A_i = B_i t_i + S_i, \qquad i = 1, 2, \ldots, n, \tag{4-1}$$

$$S_i = (\bar{B} - B_i)t_i - B_i t_c, \quad \text{where} \quad \bar{B} = \frac{\Sigma_i B_i}{n}, \tag{4-2}$$

and the condition

$$\Sigma_i S_i = 0. \tag{4-3}$$

Equation (4-1) is similar to that in previous plans. The subsidy as defined by equation (4-2) now consists of two parts. The first part equals the state's own tax rate times the excess of the average tax base over its own tax base; and the second part equals the product of central tax (or transfer) rate times the state's tax base. Either part, and hence the total, may be positive or negative. There are now $2n + 1$ equations, and, given the values of B_i and t_i as parameters, they can be solved for all A_i's and S_i's, and for t_c.

Solving for t_c[10]

$$t_c = \frac{\Sigma_i(\bar{B} - B_i)t_i}{n\bar{B}} \text{ is obtained.} \tag{4-4}$$

Thus, $t_c \gtreqless 0$, depending on whether $\Sigma_i B_i t_i \gtreqless \bar{B}\,\Sigma_i t_i$. If tax rates in small-base states are high relative to tax rates in large-base states, t_c is positive and vice versa.

From equation (4-2) the pattern of redistribution can be determined, as shown in Table 1, where + indicates gain, − indicates loss, and 0 indicates no change.

Whatever t_c is, there will be a redistribution from states with larger bases to states with smaller bases. If tax rates in small-base states are high relative to those in large-base states ($t_c > 0$), the gaining

[9] If allocation is on a progressive basis, the redistributional effects of the plan between small and large base states is accentuated.

[10] Equation (4-2) is summed, set equal to zero according to (4-3), and solved for t_c.

group will include states with less than average bases only. If tax rates in large-base states are high relative to those in small-base states ($t_c < 0$), the gainers may include some states with above-average bases.

TABLE 1
Redistribution Between States

B_i	t_c		
	> 0	0	< 0
$< \bar{B}$	+ or −	+	+
$= \bar{B}$	−	0	+
$> \bar{B}$	−	−	+ or −

Moreover, it follows from equation (4-2) that, for any given value of t_c, states with a base below the average base will be better off (gain more or lose less) if their own tax rate is high; and that states with a base above the average will be better off if their tax rate is low. Thus redistribution is primarily among high-rate states.

However, equation (4-2) does not tell what happens to a state if it changes its own tax rate, since resulting effects on the central rate must be allowed for. Solving the system for S_i and taking a partial derivative with regard to t_i,[11] the following is obtained:

$$\frac{\partial S_i}{\partial t_i} = (\bar{B} - B_i)\left(1 - \frac{B_i}{n\bar{B}}\right). \tag{4-5}$$

Since $n\bar{B} = \Sigma_i B_i$, the expression $\left(1 - \frac{B_i}{n\bar{B}}\right)$ is always a positive fraction, and the partial derivative is positive, zero, or negative, depending on whether $B_i \lessgtr \bar{B}$. Thus, the state with a less than average base always increases its gains or reduces its losses from the central tax-transfer process by raising its own tax rate; and the opposite holds for a state with a more than average base.

Most important will be the effect of the plan on the total outlays of any state, including finance out of its own revenues and by subsidy. The system is now solved for A_i and a partial derivative with regard to t_i taken. The answer is:

$$\frac{\partial A_i}{\partial t_i} = B_i + (\bar{B} - B_i)\left(1 - \frac{B_i}{n\bar{B}}\right). \tag{4-6}$$

[11] The value of t_c as given in (4-4) is substituted into (4-2) from which (4-5) is obtained.

The substitution effect is such as to give an incentive to (reduce the cost of) state services if the second term on the right is positive, and to pose a disincentive to (raise the cost of) state services if it is negative.[12] Since the second term equals $\frac{\partial S_i}{\partial t_i}$ the conclusions are the same as in the preceding paragraph. States with a less than average base are subject to an incentive effect, and states with a more than average base suffer a disincentive effect.

Assuming the income elasticity of demand for public services to be unity in all states, and price elasticity to be equal for all states and to exceed zero, tax rates will be higher in small-base states. As shown by equation (4-4) this means $t_c > 0$. This being the case, equation (4-2) reveals that only states with a base below the average will gain. The losers will include states with an average base, and may include states with less than average base.[13] This suggests that there may be a disincentive effect for the group as a whole, although no definite conclusions can be drawn without introducing behavior assumptions and assigning weights to various states.[14]

PLAN 5. In the preceding Plan, the equalization objective was stated in terms of revenue capacity. This Plan considers equalization in terms of need. The purpose under this Plan is to enable all states to obtain the same performance levels per dollar of their own tax revenue collected. Differences in base are completely disregarded. Again a federal tax or subsidy may be needed to clear the budget.

Proceeding as before, the definitional equations are:

(5-1) $\quad A_i = B_i t_i + S_i, \qquad i = 1, 2, \ldots, n;$

(5-2) $\quad S_i = (N_i - \bar{N}) t_i B_i - B_i t_c$; and the usual condition

(5-3) $\quad \Sigma_i S_i = 0.$

Given the n values of B_i, $\bar{B}$, and the parameters t_i, the $2n + 1$ equation permits the determination of n values of A_i and S_i, as well as t_c. Equations (5-1) and (5-3) are the same as before. According to (5-2) the subsidy again consists of two parts. The first part adjusts

[12] The fraction by which cost is increased (if $-$) or reduced (if $+$) is given by $(\bar{B} - B_i)\frac{(n\bar{B} - B_i)}{n\bar{B}B_i}$.

[13] This result is reinforced if income elasticity is less than unity, but need not apply if income elasticity exceeds unity, or if price elasticities differ by states.

[14] Also, allowance must again be made for income effects, which go to increase public services where $S_i > 0$, and decrease public services where $S_i < 0$.

the state's own tax yield so as to provide average performance per dollar of self-financed outlay; and the second again reflects the state's participation in the central tax or transfer such as may be needed to clear the central budget.

Solving for t_c,[15] the following equation is obtained:

$$t_c = \frac{\Sigma_i(N_i - \bar{N})t_iB_i}{n\bar{B}}. \tag{5-4}$$

Thus, $t_c \gtreqless 0$, depending on whether $\Sigma_i(N_i - \bar{N})t_iB_i \gtreqless 0$. The central rate, t_c, will be positive if the yield of state taxes or t_iB_i is large (be it due to high rates and/or large bases) in high-need states relative to the yield in low-need states, and t_c will be negative if the opposite holds.

From equation (5-2) the pattern of redistribution may again be determined, as shown in Table 2.

TABLE 2
Redistribution Between States

N_i	t_c		
	> 0	0	< 0
$< \bar{N}$	−	−	+ or −
$= \bar{N}$	−	0	+
$> \bar{N}$	+ or −	+	+

Whatever t_c, there will be a redistribution to more needy from less needy states. If state tax yields are relatively high in high-need states ($t_c > 0$), the gaining group will include states with more than average need only. If yields are relatively high in low-need states ($t_c < 0$), the gaining group will include some states with less than average need.

Also, it follows from equation (5-2) that, for any given value of t_c, states that one subjects to a more than average need will be better off if their tax rate is high, while states with less than average need will be better off if their tax rates are low. Redistribution will be again primarily among high rate states.

In order to determine the effects on a state's position which result from changes in its tax rate, resulting changes in t_c must be allowed

[15] As before, equation (5-2) is summed and, substituting from (5-3), we obtain (5-4).

for. Solving the system for S_i and taking a partial derivative with regard to t_i[16] gives this equation:

$$\frac{\partial S_i}{\partial t_i} = (N_i - \bar{N})\left(1 - \frac{B_i}{n\bar{B}}\right)B_i. \tag{5-5}$$

Since $\frac{B_i}{n\bar{B}}$ is always a fraction, the derivative will be positive, zero, or negative depending on whether $N_i \gtreqless \bar{N}$. The state with a more than average need always increases its gain (or reduces its loss) by raising its own tax rate, whereas the state with less than average need reduces its loss or raises its gain by reducing its tax rate.

Turning again to the effects of changes in a state's tax rate on its total outlays, the system is solved for A_i and a partial derivative taken with regard to t_i. The result is:

$$\frac{\partial A_i}{\partial t_i} = B_i + (N_i - \bar{N})\left(1 - \frac{B_i}{n\bar{B}}\right)B_i. \tag{5-6}$$

The substitution effect is such as to give an incentive to (or reduce the cost of) state services if the second term on the right side is positive, and to result in disincentive if the term is negative. Since the second term equals $\frac{\partial S_i}{\partial t_i}$, the conclusions are again similar to those of the preceding paragraph. States with more than average need are subject to an incentive effect, while those with less than average need are subject to a disincentive effect.

In the absence of incentive or disincentive effects, there is reason to expect that tax yields in high-need states will be high relative to those of low-need states.[17] This finding is reinforced by the incentive and disincentive effects of the Plan. Therefore, equation (5-4) tells that t_c will tend to be positive, and equation (5-2) permits the conclusion that only states with more than average need will gain. The losers will include states with less than average and states with average need, and may also include some states with more than average need. Again it appears that there may be a disincentive effect for all states as a whole, but it must again be noted that no definite conclusions can be drawn without introducing behavioral assumptions and assigning weights to various states.[18]

[16] The value of t_c, as determined in (5-4) is substituted into (5-2) from which (5-5) is obtained.

[17] It should be recalled that need as here defined is independent of fiscal capacity.

[18] As noted in Plan 4, the result will depend further on the operation of the income effect.

PLAN 6. While Plan 4 neglected differences in need, Plan 5 neglected differences in fiscal capacity. Plan 6 is a more nearly perfect equalization scheme where both sets of differences are allowed for. In this plan, performance per effort unit, as measured by the state's own tax rate is equalized. The definitional equations are:

$$A_i = B_i t_i + S_i, \qquad i = 1, 2, \ldots, n; \tag{6-1}$$

$$S_i = (\bar{B} - B_i)t_i + (N_i - \bar{N})\bar{B}t_i - B_i t_c. \tag{6-2}$$

It will be noted that equation (6-2) is similar to (4-2) in the treatment of differences in tax base, but differs from (5-2) in the treatment of differences in need. In the present case, the correction for need is applied to the yield from the equalized base, whereas in Plan 4 (with capacity differences disregarded) it was applied to actual yield. The more refined treatment of (6-2) is in keeping with Plan 6 which is designed to make full allowance for both capacity and need differentials.

As before, the condition of clearance in the central budget is:

$$\Sigma_i S_i = 0. \tag{6-3}$$

Given the n values of B_i, N_i, and the n parameters t_i, the n values of A_i and S_i, as well as t_c, may be determined.

Solving for t_c, the following equation results:

$$t_c = \frac{\Sigma_i(\bar{B} - B_i)t_i + \bar{B}\Sigma_i(N_i - \bar{N})t_i}{n\bar{B}}. \tag{6-4}$$

Thus, t_c tends to be positive if tax rates are high in small-base and high-need states relative to those in large-base and low-need states; and t_c tends to be negative if the opposite holds. However, it will be noted from (6-4) that need differentials are now weighted, reflecting application of the need correction to the average tax base in (6-2).

Turning now to the pattern of redistribution, equation (6-2) is considered. The results which may be derived from inspection of that equation are summarized in Table 3.

The tendency is for a redistribution from low need-large base states to high need-small base states. For any given level of t_c, a high rate of state tax will increase gains for winning states and losses for losing states, provided that low bases are paired with large needs and vice versa. If these characteristics are crossed, the opposite result may prevail. The earlier conclusion, that redistribution is primarily among high-rate states, need not apply here.

TABLE 3
Redistribution Between States

N_i	$t_c > 0$			$t_c = 0$			$t_c < 0$		
	B_i			B_i			B_i		
	$< \bar{B}$	$= \bar{B}$	$> \bar{B}$	$< \bar{B}$	$= \bar{B}$	$> \bar{B}$	$< \bar{B}$	$= B$	$> \bar{B}$
$< \bar{N}$	+ or −	−	−	+ or −	−	−	+ or −	+ or −	+ or −
$= \bar{N}$	+ or −	−	−	+	0	−	+	+	+ or −
$> \bar{N}$	+ or −	+ or −	+ or −	+	+	+ or −	+	+	+ or −

Proceeding as before, the system may be solved for S_i and a partial derivative taken with regard to t_i. The result:

$$\frac{\partial S_i}{\partial t_i} = \left(1 - \frac{B_i}{n\bar{B}}\right)[(\bar{B} - B_i) + (N_i - \bar{N})\bar{B}]. \tag{6-5}$$

Since $\frac{B_i}{n\bar{B}}$ is a fraction, the sign of the partial derivative now depends on B_i and N_i, as given in Table 4. An increase in the state's tax rate

TABLE 4
Relation Between State Tax Rate and Subsidy
$\left(\text{sign of } \frac{\partial S_i}{\partial t_i}\right)$

N_i	B_i		
	$> \bar{B}$	$= \bar{B}$	$< \bar{B}$
$< \bar{N}$	−	−	+ or −
$= \bar{N}$	−	0	+
$> \bar{N}$	+ or −	+	+

tends to increase the gain or reduce the loss for the high need-small base states, and to reduce the gain for low need-large base states.

The gain in state outlays to be obtained by raising the state tax is now given by

$$\frac{\partial A_i}{\partial t_i} = B_i + \left(1 - \frac{B_i}{n\bar{B}}\right)[(\bar{B} - B_i) + (N_i - \bar{N})\bar{B}]. \tag{6-6}$$

The second term on the right equals $\frac{\partial S_i}{\partial t_i}$, so that the results of Table 4 will again apply. The substitution effect is such as to provide an incentive to state taxation for small-base, high-need states; and

a disincentive for large-base, low-need states. If state tax rates can be expected to be higher in the former group, the central tax rate [as shown by equation (6-4)] will be positive and the redistribution pattern will be as shown in the left quadrant of Table 3. No definite statement can be made regarding the net effect of the plan on aggregate yield of state taxes in all states, but the earlier comments in connection with Plans 4 and 5 suggest that the over-all level of service may well be reduced.

Plan 6 is superior to Plan 3 in that the degree of benefit received by low-capacity, high-need states is made to depend on their own tax effort. This removes the serious defect inherent in Plan 3 that receiving states may enjoy a free ride while the contributing states are held responsible for their lack of tax effort. At the same time, is not Plan 6 inferior to Plan 3 in that it reintroduces substitution effects? I do not think so. Since it is the very objective of Plan 6 to equalize the tax effort (rate level) required to obtain any given level of performance, the resulting incentive or disincentive effects are not to be looked upon as undesirable side-effects of the plan, such as is the case with Plan 2. Rather, the resulting changes in the relative cost of public services reflect the central objective of the Plan, which is to equalize the relationship between tax effort and performance.

PURE INCENTIVE PLANS

The preceding plans were concerned primarily with matters of equalization. While these plans may raise or lower the total level of state outlays in the process, these changes in over-all level were incidental byproducts of the main objective of equalization. Here is a different set of plans where the objective is to give an incentive, by way of matching grants, to all states to *raise* their tax and service levels. Such plans may have redistributional results (with regard to fiscal capacity and/or need) but these now become incidental.

PLAN 7. A pure incentive plan is illustrated by a system of matching grants, where the central fisc matches all state revenues or outlays at a uniform rate. The system is given by the definitional equations:

$$A_i = B_i t_i + S_i, \qquad i = 1, 2, \ldots, n; \tag{7-1}$$

$$S_i = k t_i B_i - t_c B_i; \text{ and the usual condition} \tag{7-2}$$

$$\Sigma_i S_i = 0. \tag{7-3}$$

Given k and n values of B_i, as well as the n parameters t_i, there

are $2n + 1$ equations with which to determine n values of A_i and S_i, and the value of t_c.

The central tax now equals

$$t_c = \frac{k\Sigma_i t_i B_i}{n\bar{B}} \tag{7-4}$$

which is always positive. As may be seen from equation (7-2),

$$S_i \gtreqless 0, \text{ depending on whether } t_i \gtreqless \frac{t_c}{k}.$$

There will be a redistribution from states with low tax rates to states with high tax rates. A large base means a higher gain to the winner and a higher loss to the loser, redistribution now being centered among the large-base states.

Solving the system for S_i and differentiating with respect to t_i, the following is obtained:

$$\frac{\partial S_i}{\partial t_i} = kB_i\left(1 - \frac{B_i}{n\bar{B}}\right). \tag{7-5}$$

A state may always increase its subsidy by raising its tax rate. The resulting gain will be the greater the larger is the state's tax base, and the smaller is its share in the aggregate base for all states.

Solving for A_i and differentiating with respect to t_i, the result is:

$$\frac{\partial A_i}{\partial t_i} = B_i + kB_i\left(1 - \frac{B_i}{n\bar{B}}\right). \tag{7-6}$$

Since the second term on the right, equal to $\frac{\partial S_i}{\partial t_i}$, is positive, the substitution effect offers an incentive to all states to increase their tax rates. The cost of state services is reduced for all states, but especially for states with a large base. The plan is likely to raise the aggregate level of state services, but again we cannot be quite sure of the over-all result.[19]

[19] Suppose there is only one citizen, who consumes units of X and Y. Now let the central government impose a lump sum tax on him, and use the proceeds to subsidize X. It may be shown that this will result in increased consumption of X and reduced consumption of Y. However, our case is more complex, as a number of states are involved, and each may react differently. Any one state finds the cost of state services reduced, and this is an inducement for higher taxes and outlays on such services. However, due to the action of other states, the residents of any one state also find their income reduced since the central tax t_c must be paid. This will lead them to reduce outlays on state services. In states where the demand for state services is highly elastic with respect to income but inelastic with respect to price, the level of state services may decline, and this may outweigh the resulting increase in other states. However, this does not seem a likely outcome.

EVALUATION

Additional forms might be developed, combining the characteristics of the various plans. Block grants of the Plan 3 type may be made subject to a minimum-effort requirement. The equalization of fiscal potential, of the Plan 4 to 6 type, may be combined with incentive factors of the matching grant type. And the incentive or matching grant approach of Plan 7 may be tempered by allowing for equalization features.[20] In all cases where a central tax is needed, this tax may be rendered progressive in terms of B_i, and so forth. There is no end to possible combinations, but the above sets will suffice to show the nature of the problem.

Final choice among these plans is a matter of political philosophy as well as economics. However, some plans are more sensible in objective than others, and some have less disturbing secondary results. Thus, Plan 2 is more sensible than Plan 1, if equalization of actual budgets is to be achieved. Both Plans 1 and 2 are untenable, however, as they have violent disincentive effects and tend to a zero level of state services. If there is to be equalization of actual performance, central finance has to be substituted for state finance. A high degree of absolute equalization is not compatible with a workable system of fiscal federalism.

Equalization of capacity to meet a centrally set level of performance, as described in Plan 3, renders any one state's position in the scheme (its own gains or losses) independent of its own tax rate. The disincentive effect on state taxation disappears, but there remains the disadvantage that some states are called upon to contribute to the services of others which, while needy, refuse to make an adequate effort of their own. This remains a serious detriment to the establishment of an orderly system of fiscal federalism.

Equalization of potentials, as provided by Plans 4 to 6, does not give rise to this objection. A state now receives support only to the extent that it qualifies by its own tax effort; and other states will

[20] For instance, the subsidy under Plan 7 may be redefined as

$$S_i = kt_i\bar{B} + (N_i - \bar{N})kt_i\bar{B} - t_cB_i.$$

Since $\bar{N} = 1$, we have

$$S_i = kt_i\bar{B}N_i - t_cB_i$$

and

$$\frac{\partial A_i}{\partial t_i} = B_i + kN_i\left(\bar{B} - \frac{B_i}{n}\right).$$

contribute more, if they themselves value public services more highly. Incentive or disincentive effects again result. They differ for various types of states, and the over-all level of state services may now be affected in either direction. Substitution effects are less severe than under Plan 2, and they differ in nature. Substitution effects are now an essential part of the approach, designed to equalize the tax effort required to reach various levels of performance. Equalization of potentials may thus be accomplished within an orderly system of fiscal federalism, and among the various plans here described, Plan 6 is my favorite. It offers the most comprehensive approach to equalization. By leaving the level of state services to their own determination, it also appears to be most compatible with the spirit of fiscal federalism.

Incentive schemes such as Plan 7, are designed to raise the over-all level of state services. The distributional results of the plan are incidental and tend to contradict equalization objectives as usually conceived. However, these results may be neutralized by rendering the central tax progressive, or, as noted before, equalization and incentive objectives may be combined.

REVIEW OF ASSUMPTIONS

It remains to review the assumptions listed at the beginning of this discussion.

1. Allowance for various categories of state services complicates matters but does not change the principle involved. A state may now have different indexes of need for various services. Equalization plans may be applied to taxes for (or outlays on) particular services only, or a generalized equalization plan may be based on a composite index of need. Incentive plans may now involve different matching rates for different types of services, so that the losses or gains for any one state come to depend on its budget pattern.

2. If taxes collected by any state may be shifted to residents of other states, the simplicity of the argument breaks down. However the case may be salvaged, provided that the fraction of a state's taxes the burden of which actually falls within the state can be determined.[21] Only this fraction can be taken as an index of tax effort within the state. In the absence of a matching spillover of

[21] For a discussion of the difficulties involved see R. A. Musgrave and D. Daicoff, "Who Pays the Michigan Taxes," in *Staff Papers, Michigan Tax Study Committee.*

benefits, state taxes which are exported constitute an anarchic element in a system of fiscal federalism.[22]

3. If spillover effects are allowed for, an efficient fiscal system permits the state to tax outside its jurisdiction, be it directly, or by appropriate shifting of tax burdens to outside residents. Where this cannot be handled on the state level, a central tax-transfer system may serve to neutralize spillovers. However, such a system does not provide for redistribution or equalization. On the contrary, it serves to prevent regional redistribution, and bears no relation to the problems here considered. This function of the central fisc belongs to the efficiency problems considered in the preceding paper.

4. Introduction of loan finance breaks the equality between tax yield and amount spent, but this does not matter. In the long run at least, there is no reason why the revenue effort might not be measured in terms of "own" finance, be it in taxes or loans.

5. By assuming full employment and price level stability the problem of stabilization policy has been eliminated. Substitution of B_i^f and $\bar{B}^f$ (where superscript f stands for full employment) for B_i and $\bar{B}$, permits insertion of a stabilization feature into the discussion; and it may be desirable also, in this context, to substitute a term t_s (statutory tax rate) for our term t_i. Lest there remain a mere regional equalization of cyclical differentials, a spreading of income losses and gains over the cycle, it will be necessary in this case to drop the requirement that the central budget should be cleared and to introduce deficit and surplus finance.

6. Finally, it has been assumed that changes in the tax rate by any one state will not affect tax rates imposed by other states. In reality this may not be the case, and considerations of strategy may become important in the tax policy of large states. This must be allowed for when the stability of the various plans is considered.

EMPIRICAL APPLICATION

These various equalization plans, or variants thereof, might be applied to available fiscal data in order to determine the resulting

[22] Taxation of income by state X, even though such income is received by residents of state Y, should be considered as falling within state X, provided that such income is earned in state X, and the tax is in line with benefits which accrue to such income from expenditures by state X. The same holds for benefit taxation of commuters. On the other hand, it is not part of the tax effort of state X, as defined for purposes of this argument, if X taxes residents of state Y (through use of taxes which are exported or shifted to the outside) who do not benefit from expenditures in state X.

values of t_c and patterns of redistribution between the fifty states in the United States. This may be done either with regard to total state finances, or various segments thereof such as education finance. Time did not permit the undertaking of such applications, but they are quite possible. While the definition of appropriate indexes of fiscal capacity and need is troublesome, it can be handled.[23] Also, the various plans here outlined may be compared with recommendations of the Royal Commission on Dominion-Provincial Relations[24] and with actual practices in such countries as Australia, Germany, and Switzerland, where fairly refined methods of fiscal equalization are used.

As far as such applications are concerned, the preceding models of central interference in state finance are quite operational. However, the discussion left open the question of just how various states would react to changes in their fiscal resources and to changes in the own-cost of public services, and what would happen to the total level of state services as a result. In order to permit conclusions in this respect, the models must be supplemented by behavioral assumptions, but unhappily little empirical data is available on which such assumptions may be based.

2. *Plans Relating Central Fisc to Individual Citizens of Federation*

The philosophy of fiscal federalism underlying the preceding plans was that all states of the federation should be placed in a more or less equal fiscal position, be it in the sense of service levels, capacities or potentials, and that all states should be induced to raise their services. Beyond this, there was no attempt to equalize the gains which *individual* citizens of the federation may derive from state fiscal activities. Rather, the individual is left to the mercy of the political decisions arrived at in their particular states. By its very nature, this approach required transactions between the central and the state fiscs.

There is a second and quite different philosophy of fiscal federalism. Here, the idea is that the central fisc should neutralize the individual citizen of the federation against the fiscal operations of

[23] See Selma Mushkin and Beatrice Crowther, *Federal Taxes and the Measurement of State Capacity*, Washington, Public Health Service, U.S. Department of Health, Education, and Welfare, May 1954.

[24] See *Report of the Royal Commission on Dominion-Provincial Relations*, Book II, *Recommendations*, Ottawa, 1940.

the particular state in which he resides. This requires direct transactions between the central fisc and the individual citizens of the federation. For this reason it seems more centralist in spirit, but this need not render it necessarily inferior or superior. The choice, as noted before, remains one of political philosophy and social preference.

No attempt will be made to explore this second approach in detail, but a brief discussion is needed, if only to place the first approach in its proper perspective. It is necessary to distinguish between (1) objectives relating to problems of "horizontal equity" or the principle that equals should be treated equally, (2) objectives relating to "vertical equity" or the requirement of differential treatment of unequals, and (3) efficiency objectives.

EQUITY OBJECTIVES:

A. Horizontal Equity

It is assumed that the fiscs for each state meet the requirement of horizontal equity among their own citizens, and that the same holds for the operations of the central fisc in providing federation-wide services. As a result, horizontal equity is assured for citizens of state X insofar as the combined state X and central fiscs are concerned, and the same holds for citizens of state Y and other states. However, the same need not hold as between citizens of states X and Y. While their positions are the same under the central fisc, the position of equals may differ with regard to their respective state fiscs. Hence their positions may differ with regard to the total (combined state and central) fisc.

J. M. Buchanan, in his pioneering paper, has suggested that it should be the function of the central fisc to eliminate such differences, so that all citizens of the Federation who are otherwise equal will be treated equally under the total fisc, no matter what state they live in.[25] Buchanan argues that this objective has a certain claim for priority because: (1) it is more sensible to consider relationships of the central fisc to individuals, rather than to the states "as such"; (2) as a matter of equity, the requirement of horizontal equity is more meaningful than is that of vertical equity; and (3) the scheme tends to neutralize distorting effects on resource allocation which

[25] See J. M. Buchanan, "Federalism and Fiscal Equity," *American Economic Review*, September 1950, pp. 583–600, reprinted in *Readings in the Economics of Taxation*, R. A. Musgrave and C. Shoup, eds. Also, see the subsequent discussion by H. P. Jenkins and J. M. Buchanan, in *Journal of Political Economy*, August 1951, pp. 353–9.

result from differences in the fiscal activities of states. Leaving (3) for later consideration, I should note that to me neither (1) nor (2) are convincing.[26] However this may be, the matter of priority need not be debated here. For present purposes, it is quite sufficient to recognize Buchanan's interesting case as one among possible objectives.

Suppose first that the requirement of horizontal equity is applied with regard to taxation only. Assuming tax structures in all states to be proportional, an opposite of Plan I could be applied, except that the subsidy now would go to each individual citizen rather than to his state. Redistribution is from low-rate to high-rate states, and severe incentive effects result with regard to the level of state taxes. If the tax structures of states are progressive by varying degrees, a more complex pattern of interstate redistribution results. However this may be, there is still a strong disincentive effect.

This difficulty is avoided by Buchanan's proposal to reinterpret the requirement of horizontal equity in terms of equality of fiscal residue, defined as expenditure benefits minus tax payments. Given the crucial assumption that benefits from state expenditures are equal for all citizens of the state, Buchanan can easily compute the fiscal residue for taxpayers at various points in the income scale. In a state which relies only on poll-tax finance, the fiscal residue equals zero for all residents, regardless of income. For any tax structure less regressive than a poll tax, the residue falls from a positive to a negative level when moving up the income scale. As states do not use poll tax finance and the tax structures and service levels of various states differ, individuals with equal incomes but living in different states are left with different fiscal residues. A central tax-transfer plan is devised to equalize them.

A comparison may be drawn between State X with a high, and State Y with a low, per capita income. We assume that both pay a proportionate tax. If the rate is the same in both states, an individual with a given income would have a higher fiscal residue if living in X

[26] With regard to (1), I would not interpret the preceding plans as relating the central fisc to the states "as such." Rather, the central fisc takes as given the political process of social preference determination as arrived at by various groups of citizens of various states. This indeed would seem the essence of political federalism.

With regard to (2), how can it be held that "equal treatment of equals" as a matter of *equity*, is more important than is the proper differentiating between unequals? If the latter does not matter (because it cannot be determined or otherwise), how can any meaning be imputed to the former, other than that of establishing a rule which avoids malicious differentiation? If so, tax distribution by lottery would do as well.

than if living in Y. This follows because he pays the same tax in both cases but receives more benefits if residing in X. Similarly, the residents of X will be better off than their counterparts in Y if the same total revenue is collected in both states, since now a person with a given income pays less tax if living in X while receiving the same benefits. In both these cases in which the residents in X are better off, the central equalization scheme will favor the residents of Y. The same conclusion applies to the in-between cases, where the tax rate in X is lower than in Y while total revenue in X is still higher. No simple rule can be set down, however, for situations where total revenue in X is less than in Y, or where the tax rate in X exceeds that in Y. In these cases the outcome depends on the relative levels of tax rate as well as per capita incomes.

It should be noted that these particular results, as well as Buchanan's illustrations, are based on the assumption that expenditure benefits may be distributed on a per capita basis. If we assume instead that benefits are proportional to income, the result changes. In a state with a proportional tax structure the fiscal residue is now zero at all income levels, and the principle of equal treatment of equals now holds as between the residents of all states which have proportional tax structures, whatever their service levels. While this does not change the formal nature of Buchanan's argument, it indicates that the specific results will depend entirely on one's assumptions regarding the distribution of benefits. While the redefinition of horizontal equity in terms of fiscal residue is an interesting and sensible idea, its implementation is exceedingly difficult.

This leads me to a more basic point. If state taxes, imposed to finance public services, are allocated on a benefit basis, all citizens of the federation will be taxed on a benefit basis by their respective states. In this case, no central equalization is needed since the requirement of horizontal equity is met by the very condition of universal taxation according to benefits received.[27] Differences in treatment can arise only out of tax transfer schemes, imposed by states to

[27] The concepts of horizontal and vertical equity do not fit into a normative system, where public services are supplied on a benefit basis and a tax-transfer mechanism is used to redistribute income. The principle of equality then becomes that everybody is subjected to benefit taxation, and everybody is made subject to the same scheme of redistribution. On this division of functions see Chs. 1 and 2 of my *The Theory of Public Finance*, McGraw-Hill, 1959.

This leaves open the question whether benefit taxation (and hence the principle of equality) should be defined in terms of equal *marginal* benefits or equal *total* benefits. In the first case, everyone is taxed so that the marginal benefits which *he* derives from

implement their particular notions as to what constitutes the socially desirable state of distribution.

B. Vertical Equity

The problem, in this case, becomes one of desired central interference into income-redistribution policies of the states. Let us suppose that both central and state fiscs have distributional objectives. If the state adjustment is made first (where state taxes and transfers apply to income before central tax) and the central adjustment comes second (where central taxes and transfers apply to income after state taxes), the state adjustments will not affect the end-result, but only determine the particular pattern of federal taxes and transfers. If the central adjustment comes first, the state pattern is the one which finally prevails in each state. If both levels insist on their pattern as the final goal, an unstable situation results.

Since one level must be given priority, there is much to be said for making this adjustment at the central level. Looking at the matter in a normative way, it is clear that state taxes will then be based properly on income minus those central taxes or plus those central transfers which reflect distributional adjustments by the central fisc. Central taxes raised to provide for central services will not be allowed in deducting for purposes of state taxation, as they may be considered use of income. Central taxes in turn would be assessed on total income, without allowance for state taxes to provide state services.

EFFICIENCY OBJECTIVES

In the preceding discussion, the Buchanan plan was looked upon as a formula for horizontal equity. Alternatively, it may be considered a design to neutralize distorting effects on location which result from differentials between the fiscal operations of various states.

Let it be assumed that, in the absence of differentials among state

his outlays on public services equals the marginal benefit which *he* derives from his private outlay. In the second case, there is an equating of the total benefits which various people derive from their transactions with the fisc. This includes the consumer surplus which Mr. X derives because his co-citizens like public services so that the unit cost to him is low, as compared to that derived by Mr. Y who lives in a state where his co-citizens do not wish to pay for public services. This difference corresponds to gains which the consumer derives in his private purchases if his preferences are dissimilar from those of rival consumers. Since the latter gains are usually taken as given when defining a "proper" distribution of income, it seems preferable to apply the same reasoning to the tax case, and to define benefit taxation in marginal terms.

fiscs, market forces lead to an optimal location of economic activity in the private sector. Now fiscal differentials are introduced between the states, and the pattern of location changes. Buchanan suggests that such changes could be avoided if fiscal residues were neutralized. Following the preceding argument, it is again concluded that such differences would not arise, and that locational distortions would be avoided, if all state taxes were imposed on a benefit basis, even though at different levels.[28] Differences in net residue would remain only if various states pursued different distribution policies, in which case the appropriate adjustment would be to let the central plan for distribution dominate.

All this is a much too simplified view of the problem. For one thing, there is again the question of just how the benefits are distributed among individual residents. For another, there are a host of difficulties which arise from interstate commerce and the structure of the corporation. Even if it is assumed that all tax revenue is obtained from personal income tax, benefit taxation or equalization of net residue at the personal level neutralizes the location of firms only if management is identified completely with the owner, which is surely an unrealistic assumption. Moreover, certain benefits accrue to business firms rather than to individuals, and many state and local taxes are (and for benefit purposes must be) levied on the firm rather than the owner. This poses difficult problems of interregional shifting of benefits and burdens, all of which complicate benefit taxation by regional units, as well as interregional equalization of net residues. As shown in the preceding paper, certain gains in efficiency may be derived by appropriate regional dispersion of the fiscal system. At the same time, the mechanism of decentralization is apt to be imperfect. It will tend to introduce unneutralities and, by narrowing the "common market," add new inefficiencies. Not only may location of industry be interfered with by differential fiscal policies, but also the threat of capital flight to low-tax (or, rather, high net-residue) states may prevent a proper allocation of resources between the satisfaction of public and of private wants.

Apart from all this, there remains the question of how efficiency in location is affected by various plans for equalization between states, such as were discussed in the first section of this paper.[29]

[28] On this point, see comments by Buchanan and my rejoinder.

[29] See James M. Buchanan, "Federal Grants and Resource Allocation," *Journal of Political Economy*, June 1952, pp. 208–17; also see the literature there referred to and the discussion with A. D. Scott in the December 1952 issue of the same journal.

By increasing the economic capacity of poor regions, the outflow of resources is checked, and this may interfere with speedy transition to more efficient location. At the same time, mobility may be limited to begin with, and appropriate plans for regional equalization may aid rather than hinder efficiency for the country as a whole.

COMMENTS

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An ancient proverb suggests that being the "big frog in the little pond" is sometimes a desirable state of affairs. My comment is designed to demonstrate that this state of affairs is achieved only at a cost, and that the fully rational frog (whose utility function is independent of those of his fellows except as to be developed herein) must *always* choose the big pond precisely because there are likely to be bigger and better frogs present.

This proverbial analogy gets us directly to one of the central economic problems of federalism. At the expense of neglecting the many other provocative aspects of the two papers, I shall confine my formal discussion to this central issue. I do so partially to exploit this occasion to modify and to correct certain portions of my own analysis that appeared in the work to which both Musgrave and Tiebout refer. This seems warranted since Musgrave seems to accept, at least by inference, certain implications of my earlier argument which I now believe to be in need of substantial correction. Tiebout specifically discusses the issue I want to raise when he introduces income differences into his analysis, but he does not examine the implications fully.

I begin with a brief examination of the word "redistribution" as this is used in the discussion of a fiscal system. I have previously characterized a fiscal system as being "redistributive" if the higher income individuals bear a "net tax" and the lower income receivers receive a "net benefit." The fiscal residuum, that is to say, the net tax or net benefit, is computed by estimating for the individual his share of total taxes and total benefits from governmental services, *in cost values*. If the residuum resulting from this subtraction of benefits from taxes is positive, the individual pays a "net tax," if negative, he receives a "net benefit." If the residuum is zero, a *quid pro quo* exists between the individual and the fisc, and, in so far

as this particular individual is concerned, the system is defined to be distributionally neutral.

On the basis of this means of calculating the over-all fiscal residua of individuals in the separate subordinate units of a federation (states), and adopting the normative rule of "equal treatment for equals," or as Musgrave calls it, the rule of horizontal equity, I proposed a conceptual scheme for computing a set of interarea transfers of revenue.

The inference of this analysis is that, if the separate subordinate units attempt to accomplish some redistribution, in the sense here defined, some interarea or interstate fiscal adjustment is suggested by equity as well as efficiency considerations. But, as Musgrave has properly shown, the negative inference from my model is perhaps more important than the positive. The inference is clear that, if the subordinate units do not attempt to undertake redistribution through their fiscal systems, redistribution in the sense defined above, each individual is confronted with a zero fiscal residuum, and, consequently, the argument for interarea fiscal transfers vanishes.

Up to this point there is no error in my earlier analysis or in Musgrave's interpretation of it. The modification or correction that now seems required is to make quite clear that the presence of the *quid pro quo* relationship between the individual and the government does not necessarily guarantee that the individual is subjected to equal over-all fiscal "treatment" with his "equals" in other subordinate units. This fiscal equivalent of the diamond-water paradox rises to confuse us here. Economists have failed to distinguish carefully between benefit taxation defined in *total* and *marginal* terms. Musgrave points to this distinction in a footnote, and Tiebout also recognizes the distinction in his analysis, but, somewhat surprisingly, neither of them follows up the implications for the problems of federalism.

Interpreted in terms of some equality between total contributions made and total benefits received, the benefit principle is, of course, nonsensical. As Jevons and Einaudi have both emphasized, governments could, on such a principle, exact from the individual almost everything above the bare subsistence minimum. The only relevant benefit principle must be that of equalizing marginal benefits received from government services with the marginal taxes paid. This makes the benefit principle analogous to market pricing in respect to the *quid pro quo* relationship that is established between the buyer and

seller of government services. The individual gives up the maximum amount that he is willing to give up to secure the *specified* amount of public services available. He does not give up the maximum amount that he would be willing to give up were he to be faced with an all-or-none choice. He receives a genuine "taxpayer's surplus," and it is worth noting that this "taxpayer's surplus" may still be positive in situations where the individual is subjected to a "net tax." In other words, the individual may be forced to pay more for government than he would pay, were government services available to him at uniform market prices, and still enjoy some "taxpayer's surplus."

The presence of the *quid pro quo* relationship suggests only that the individual is confronted with a marginal tax rate equal to the marginal benefits he receives from public services. The total fiscal situation in which the individual finds himself is determined on the other hand by the total tax pressure exerted on him by the fisc in comparison with the total benefits he receives from having public services available to him. The *quid pro quo* is, therefore, only a necessary, not a sufficient, condition to insure that all individuals are subjected to equal fiscal treatment. Viewed in this way, it is clear that, even if all the states in a federation adopted the pure benefit principle in organizing fiscal systems, there would still remain major fiscal advantages to locating in a community with a relatively larger number of high-income receivers, as Tiebout recognizes. The taxpayer's surplus for any given individual, otherwise indifferent as to location as among communities, will normally be higher in the community with the largest proportion of high-income receivers. This conclusion is obvious, and it stems from the spillover or external effects arising out of the consumption of public goods, effects that the Lindahl-Musgrave-Bowen-Samuelson models have made clear.

It is quite easy to illustrate the main point in very simple terms. Take two suburban areas, one rich, the other poor. Neither unit possesses taxing power so that all local collective action must be genuinely voluntary. Each of the two areas needs to add some playground equipment in its centrally located park. It is evident that the amount of equipment per capita will be larger in the richer community than in the poorer. Other things equal, the individual, faced with a choice, will locate in the richer community.

Even if no collective action takes place, a situation where an extreme form of "benefit" taxation applies, the effects discussed here will be present. Examples are close at hand. If an individual

has decided to spend $30,000 on the purchase of a house, and his utility function is not influenced by relative standing in his local community, he will, other things equal, find it more advantageous to buy a home in an area dominated by $60,000 houses as compared with another in which $15,000 units abound. Why is this true? For the reason that, in moving to the "rich" community, the individual is able to secure some of the spillover effects of private actions taken by other homeowners in preserving and beautifying the landscape; e.g., the care of lawns, flower gardens, etc. Note here that there need be no interdependence among private decisions resulting in *collective action* of any sort. The individual who considers purchasing the $30,000 house may be quite unwilling to pay more than a *zero* marginal price or tax to insure that his richer neighbors *expand* their flower gardens. Interference with the private market process is justified only if the interdependence among individuals' decisions involves the marginal decisions of individuals considered. Modern welfare economists have not always steered clear of this modern version of the diamond-water paradox.

But I must return to the main point. The application of the benefit principle of taxation, in the only meaningful sense that this principle can be applied, does not, indeed cannot, eliminate the differential fiscal advantages conferred on the average resident of the relatively richer communities in a federation. This true fiscal differential is present solely by fact of the community's relative richness. These differentials will be present in all cases where there is interdependence among individual decisions, either marginal or inframarginal.

The differentials are real, and any consideration of over-all efficiency in resource usage must take them into account. If we continue to assume that states in a federation do, in fact, finance all public services on the basis of marginal benefit, we must try to describe the resulting equilibrium. In small communities, such as the residential suburbs of metropolitan regions, the fiscal advantages and disadvantages may, at least for a considerable time period, be almost fully capitalized. The original developers and early settlers of the community will reap the differential gains, and the prospective residents entering the community after its pattern has more or less been determined will find the community's expected future net fiscal advantages capitalized into the original price of land. The cost of land will be higher than that of similar land in the poorer community.

If we look at the larger units, say, the states in this country, the description of full resource equilibrium is more difficult. Land values will still, to some extent, reflect the net fiscal advantages and disadvantages of location. But land, broadly considered, is as producible as any other capital good. Investors in the production of "land" will not find it profitable to develop areas expected to be dominated by clusters of low-income residents. Such areas will tend to be "underdeveloped" relative to those geographic areas more favorably situated in terms of expected occupational cluster. If this differential developmental pattern materializes, the prospective purchaser of land in the two areas may find developed land prices substantially equivalent. If this is true, the net fiscal advantage or disadvantage must take the form of an equalizing difference in the returns to labor. The individual must be rewarded for moving into the low-income area by the expectation of a slightly higher salary or wage in relation to living costs. On balance, both of these effects seem likely to occur. Land values would tend to be higher, and wage and salary levels for comparable skills slightly lower in the states with proportionately larger numbers of higher income receivers. Such differentials will characterize full resource adjustment only if all other forms of equalizing differences are assumed away. In the real world, other equalizing differentials may, of course, more than offset the ones considered here. But it should be noted that in a period when public or collective activity, especially at the local level, is increasing rapidly the differentials discussed here assume increasing importance over time.

Before we proceed further, we must examine somewhat more carefully the characteristics of a fiscal system that is organized on the basis of pure economic considerations, that is, a system embodying taxation in accordance with the principle of marginal benefit. In order for resources to be efficiently allocated as between the private goods and the public goods sector, this principle must be followed, as Musgrave and Samuelson have shown. In any position where the necessary conditions for Pareto optimality are satisfied, the rate at which each individual is willing to substitute public goods for private goods must be equal to the rate at which he is forced to give up public goods for private goods. To this point, the analogy with the welfare conditions for the purely private goods world is complete. But here it stops. The marginal rates of substitution between public goods and private goods are not necessarily

equal as among the separate individuals. If the externality features of public goods were not present, individuals would find it advantageous to "trade" public goods among themselves until a uniform price were established. But such trading is impossible by definition. In a federation, however, "trading" can take place indirectly. Individuals can, in effect, "trade" public goods by shifting from one locality to the other. In this way, the total taxpayers' surplus is increased.

All of the preceding discussion has been based on the assumption that states do, in fact, organize their internal fiscal systems on the basis of efficiency considerations. Of course they do not. State systems, although less "redistributive" than the federal system, are "redistributive" in the sense defined. There remains the question: Does the criterion of equalizing fiscal residua for equals in the separate states, the criterion I proposed several years ago, retain any validity from the efficiency point of view?

If no interarea transfers of revenue are undertaken by the central government, and states do attempt some net "redistribution," there will clearly be some excessive shifting of resources to the states characterized by concentrations of high-income receivers. Not only will the "true" fiscal differential discussed above be present, but also the effects of the attempted redistribution policies will provide still a further fiscal incentive for individuals to migrate toward the richer states. The net fiscal advantages and disadvantages will tend to be equalized by a system of interarea transfers based on the equity criterion. In effect, the implementation of a set of transfers based on this rule would introduce uniform pricing for government as among "equals" in the separate locations. The individual would be insured that he could "purchase" the same amount of government for the same price regardless of geographic location. This policy would act directly on the geographically discriminatory pricing of government services that is implicit in the principle of state taxation in accordance with marginal benefit, and which is even more pronounced in the more realistic fiscal systems actually existing. This policy would act directly to remove the fiscal differentials instead of forcing the burden of adjustment on resource movement to equalize the net advantages and disadvantages.

There is an analogue to this in price theory. Under what conditions should price discrimination be prohibited legally? If the consumer is assumed to have available to him sufficient alternatives, no attempt

is normally made to prohibit sellers from discriminating in price if they so desire. The full adjustment is placed on the workings of the market. On the other hand, if the buyer is assumed not to have open sufficient alternatives, price discrimination by sellers may be subjected to direct prohibition. The case with fiscal federalism is quite similar. On economic grounds, no case can be made for interarea revenue transfers if the geographic mobility of resources and the multiplicity of state and local fiscal systems are considered sufficient to constitute acceptable alternatives to the buyer of government services. From this position, the inherent geographical discrimination in the pricing of governmental services in a federation need not be cause for concern or for specific public action in the form of transfers among the state units. On the other hand, a second position would suggest that the geographic mobility of resources and the existence of the several states do not constitute effective alternatives to the individual, and that, on both equity and efficiency grounds, the fiscal differentials should be attacked directly by a system of revenue transfers.

As Tiebout has shown, if the "early settlers" of the "richer" communities take action, by means of zoning restriction or otherwise, to prevent the "trading through migration" from taking place, the second position becomes stronger. One way or the other the "rich" should be willing, not to "pay taxes for the poor" (Tiebout's words are ill-chosen here for there are no strictly distributional issues involved), but rather to share the benefits of their own collectively provided services. Insofar as the goods in question are purely "public" in the Samuelson-Musgrave polar sense, the "rich" can share these goods without cost to themselves. In fact, per capita costs can be actually reduced as Tiebout shows in his model. Hence, for the "early settlers" to refuse to share "public goods" with new migrants would seem to represent a genuine dog-in-the-manger attitude. But, of course, complications arise as soon as it is recognized that the extreme polar case does not describe reality. As Tiebout suggests, all collectively provided goods and services are partially "public" and partially "private." This being the case, the immigration of new citizens into the "richer" communities will always reduce, to some extent, the taxpayers' surplus of the early settlers. Prohibitions on entry become economically rational, provincially considered. As Margolis suggests in his paper, land owners will forego capital gains in order to prevent entry of "undesirables"

into the community. But this sacrifice of capital gains on possible land holdings may be more than offset by the retention of a greater share of taxpayers' surplus. In a very real sense, zoning restrictions and other like devices can be considered as means through which "early settlers" attempt to create a structure of property rights in "taxpayers' surplus."

As we now compute GNP, the policy of providing some interarea revenue transfers to offset fiscal differentials would tend to increase national measures of product. Despite this fact, and despite Samuelson's interesting recent note on the economics of marriage, I must somewhat reluctantly conclude that my position in support of substantial interarea transfers has been modified under the influence of the Musgrave-Samuelson clarification of the nature of public goods and the interesting local government models of Stigler and Tiebout. These influences, coupled with the fact that serving as a discussant on this program has forced me to rethink some of my earlier analysis, lead me to put much less emphasis than previously on the efficiency basis of intergovernmental revenue transfers.

This leads to my final point. Unless intergovernmental fiscal transfers of revenue can be justified on equity or efficiency grounds, there remains only the interarea fiscal interdependence producing the spillover effects mentioned by Tiebout. Here the whole question boils down to determining the extent of importance of these effects, and, at least at the currently important margins of decision, I do not think these effects are significant.

C. LOWELL HARRISS, Columbia University

Most of us probably join with Professor Musgrave in endorsing the principle that the power of government can be wisely used to reduce economic inequality.[1] Presumably the general public welfare will be served. In at least one respect, however, substantial *inequality* may serve the *general public interest* constructively—the public of the entire economy or the entire free world. I speak of education, the largest nonnational expenditure and perhaps the single type assumed by Professor Musgrave. (Of course, it has spillover effects, but I can think of no significant state expenditure having no spillover.)

The world needs people with superior education. Everyone has

[1] I now feel that the reduction of poverty rather than the reduction of inequality ought to receive the major emphasis. This, however, is a different issue from the one I want to discuss here.

an interest—one he may not always appreciate adequately—in the existence and the efficient use of people with the highest of training. Excellence—in diplomacy, statesmanship, art, science, medicine, architecture, entertainment, religion, judicial decision, national defense, or economics—requires great skill. It calls for extensive and expensive training. Not many school districts can afford top quality elementary or secondary schooling, at least not until we are a much wealthier nation than today. But some communities are able and willing to provide much more than others. In doing so, these communities serve the *general* public. Inequality makes possible a kind of accomplishment for the whole society which would not be attainable under conditions of equality.

The transfer of resources from high- to low-income areas (or people) will permit some to improve the quality of education they offer (or obtain). Such improvement is in the general public interest. Not improbably, there will be an increase in the average level. Yet financing the transfer may reduce significantly the ability of the few to provide excellence. If so, the general public will suffer. Raising an average does not meet the need for superior human achievement. I wish that we had the income and the willingness to make every school system better than the best today. Unfortunately, we do not. If I am right, therefore, if there is a national interest in excellence in education, this fact has a place in models for the transfer of income. A program of equalization will reduce the ability, and perhaps the willingness, of a relatively few school districts to provide high quality education. What the country loses as a result may be different in kind from the gains it enjoys from bettering the quality a little in many times as many schools.[2]

To repeat: The whole public benefits from excellence. The communities which offer superior education thereby help meet a need of the nation as a whole. Equalization programs may increase the total of educational opportunity and serve the entire society. Yet these programs may also reduce the supply of a type of education which is an essentially different product from that which is added.

[2] Our present system, heavens knows, is not an efficient arrangement for developing excellence. In this respect we suffer from an aspect of the problem noted by Professor Tiebout—space. If children are to live with their parents, much human potential cannot in our generation be offered top quality opportunity in elementary and secondary schools. Moreover, good schools will be wasted on many people of mediocre capacity. One advantage of cities is that educational facilities of varying quality can be made accessible to many children.

Equality cannot permit us to serve all our needs—and the "our" is the general public, society as a whole—including those for superior training, until the economy has much higher income than it does today.

BURTON A. WEISBROD, Washington University of St. Louis

External, or spillover effects are at the heart of many problems of fiscal federalism. Professor Tiebout argues that under certain circumstances these effects may be disregarded with impunity by the analyst —a most important conclusion, if correct. Thus, he states:

"With uniform demand, population, income, and, in turn, uniform services, each community will receive back as much in spillover as it contributes to its neighbors . . . and the per capita benefits exchanged are equal. . . . [Thus], the problem of spillover . . . is of no concern."

If by "no concern" is meant that in the case outlined there would be no need for an ethical arbiter to make transfer payments because of inequalities in exchange of spillovers, then Tiebout is quite right. But, equity aside, there remains the question of the efficiency of the aggregate output of public goods—where the "efficient" rate of output is that at which marginal social benefit (defined according to some social welfare function) equals marginal social cost; and in this regard, there is no cancelling out of the spillover effects; there is reason for concern. The output of the good (e.g., Tiebout's example of mosquito spraying) by each community, and, hence, both communities, will be, in general, too low.

In presenting the case, I assume that each community takes as "given" the anticipated level of spillover benefits it is to receive from the other community, and then makes its expenditures decisions. Of course, the efficiency of the resulting levels of expenditure depends on whether each community (1) errs in assuming a *higher* level of output by the other than actually occurs, or (2) errs in assuming a *lower* level, or (3) correctly anticipates the other community's output.

The point to be recognized here is that, even if each community *correctly* estimates the other's production, aggregate output of both communities will be nonoptimal in the sense defined above—i.e., will be too small. The argument is simple: Each community produces

Note: I have benefited from discussion of this subject with my colleague, Ronald G. Ridker.

the level of output at which, given the spillover benefits from the other community's output, *its* marginal *community* benefits equal its marginal community cost; but, since marginal community benefits (i.e., within one community) are less than marginal *social* benefits (to both communities), by virtue of the external (spillover) benefits, each community stops short of the social optimal level of production, presumably being unconcerned about benefits from its actions which fall outside its boundaries. *Each* community produces too little; there is no "canceling out" of inefficiencies, although, as Tiebout correctly points out, "the per capita benefits exchanged [by the communities] are equal." Note that this result occurs even though we assume complete knowledge—that each community realizes that it is both a provider and a recipient of spillover benefits, and moreover, knows the amounts of spillover in both directions; the result is just another example of the generalization that output may be expected to be suboptimal whenever there exist external economies in production or consumption. Hence, the achievement of social optimality necessitates some intercommunity cooperation, or a higher level government to see to it that the formerly external benefits are given proper consideration when output decisions are made. Contrary to Tiebout, there *is* reason for concern.

Finally, it is interesting to note that, dropping the assumption that each community correctly predicts its spillover receipts, each community's attempt to achieve its (community) optimum level of output *could* lead to the social optimum, *if* it *under*estimated by the appropriate amount the spillovers it actually received. We saw above that the deviation of social from community marginal benefit led the community which *correctly* knew what spillovers it was to receive to *under*produce; ignorance (underestimation) of spillover receipts would, *ceteris paribus*, lead it to overproduce. The counteracting effects of these two factors could lead to the social optimum level of output, though we can hardly count on such a result.

Reply by Mr. Musgrave

If I understand Professor Buchanan's comments correctly, he now proposes a double standard. As far as *equity considerations* are concerned, he agrees with me that adherence to benefit taxation by states equalizes net residues, thus rendering central interference unnecessary. This assumes the usual interpretation of benefit

taxation as equating the marginal utility of tax and private outlays for any one taxpayer. However, Professor Buchanan suggests that such a policy would not do the job of neutralizing the *allocation effects* of state fiscs. In order to accomplish this, so he argues, there would have to be equalization of total net benefits (including consumer surplus) as between taxpayers. Thus, equity and efficiency considerations require different standards and are, in fact, incompatible.

Suppose that citizen x obtains a greater total net gain from his transactions with the fisc in X land than does y in Y land, both x and y having equal tastes and incomes. This will be the case where the cost share for x in public services will be smaller if he resides in X land than if he resides in Y land because (1) the tastes of other residents place a higher preference on public services in X land than in Y land or (2) average income is higher in X land than in Y land. Depending on the importance of these factors relative to the weight of other locational considerations, fiscal factors may have a significant effect on x's choice of location. Such will be the case even though the tax structure in both X and Y adheres to benefit taxation in the marginal sense.

However, I am not at all certain 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 distribution of natural resource deposits. The fact that the benefit incidence of public services is spacially 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 structuring of public finances.