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VOLUNTARY EFFORT AS A TAX SUBSTITUTE IN THE REVENUE-SHARING ALLOCATION FORMULA*

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THE PROBLEM

As a cost reducing measure, it is appropriate that local government officials use voluntary labor in their programs supplying public services to constituencies. The Revenue-Sharing Act of 1972, however, may actually serve as a disincentive to this use of voluntary effort, because the revenue-sharing allocation formula may discriminate against communities using voluntary labor. Stinson and Stam state that "the current allocation procedure (of revenue sharing) fails to take into account the cost of inputs which are not purchased with tax revenues" [7, p. 11]. They further suggest that "the most important of these neglected costs is the opportunity cost of voluntary labor" [7, p. 11]. Hitzhusen states, "to the extent the smaller communities substitute . . . volunteer for paid effort, then tax effort, and thus their revenue-sharing payment, is decreased" [2, p. 10]. The problem is one of examining alternative ways of modifying the present revenue-sharing allocation formula to include the value of voluntary effort. Providing fire protection services to rural areas by employing voluntary labor is the example used here.

OBJECTIVES AND APPROACH

Specific objectives of the study are: (1) to illustrate how the tax-effort coefficient functions in the revenue-sharing allocation process; (2) to demonstrate alternatives for imputing value to voluntary efforts used in providing fire protection services; (3) to incorporate these imputed values into the revenue-sharing allocation process, and to assess the impact of this incorporation upon the level of revenue-sharing entitlement allocated to a community.

The study involves Cumberland County, Tennessee, where, in 1974, Tennessee Valley Authority (TVA) initiated a pilot project designed to provide adequate fire protection service to county residents.[1] The project embodied a countywide approach, aimed at improving both quantity and quality of fire protection services for the rural areas of the county, outside present fire-protection service jurisdictions. With the exception of six full-time professional firemen, the success of this program is dependent entirely upon the voluntary efforts of individuals who live and work in the county.

Alternative imputed values for voluntary effort were incorporated into the county area revenue-sharing allocation process. The alternative imputed values become, in effect, a Voluntary Effort Tax Equivalent (VETE). This is combined with the original measure of tax effort to give a more inclusive General Tax Effort Coefficient (GTE). The VETE's of Alternative I and Alternative II are based upon specific levels of professional equivalency used or suggested for use by the Insurance Services Office

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[1] This study was based upon personal interviews with Fire Chief Jim Isham of the Cumberland County Volunteer Fire Department and with Billy E. Townsend, Tributary Area Development Representative, Office of Tributary Area Development, Tennessee Valley Authority, Knoxville, Tennessee, during the summer of 1975.

(ISO) when evaluating volunteer fire departments.[2] VETE of Alternative III is based upon the market cost of an equivalent level of fire protection.

New GTE's are incorporated into the revenue-sharing allocation formula at the county area level. Varying final entitlements are then compared to each other and to the original entitlement, using total and per capita bases of comparison.

Examples are strictly for the purpose of imputing a realistic value, in dollar terms, to the voluntary effort used in supplying fire protection services. Therefore, no effort is made to include this imputed value in the aggregate income level. Additionally, it should be recognized that the revenue-sharing process is dependent upon each unit and coefficient of measurement in the formulas as they relate to one another. In turn, these values are related to aggregate level measurements. Due to this interdependence, actual values netted out by incorporating a VETE in the statewide allocation process would differ from those obtained in this isolated case study.

THE RESULTS

Original Entitlement for the Cumberland County Area[3]

To illustrate calculation of the revenue-sharing allocation to a county area, the following text describes that of the original entitlement for the Cumberland County Area.[4] First, three basic coefficients are multiplied together to obtain the County Area Product (CAP). These coefficients are the GTE,[5] relative per capita income[6] and population of the county area.[7] Total adjusted taxes amount to $781,709; total income to all residents amounts to $36,262,017 [1, p. 323-324]. The GTE is then determined to be .0216. Based upon income data for Tennessee and Cumberland County, the relative income coefficient equals 1.7058 [8, p. 387]. Multiplying these two coefficients together and then multiplying by the population of the county, currently 20,733 [1, p. 323], gives a CAP for the Cumberland County Area of 763.9132 (Table 1).

The CAP of a county area becomes functional in the allocation process when related to other county areas of the state. The second step, therefore, is to obtain a total of all CAP's by the addition of the Cumberland County CAP to the sum of all other CAP's. To obtain the Allocation Coefficient (AC) in the third step, the Cumberland County CAP is divided by the sum of all CAP's in step two. In this case, the AC equals .0051. Finally, to obtain the actual entitlement for the Cumberland County Area, the total Tennessee allocation for *all* local governments ($80,147,593) is multiplied by the AC that is found in step three. The revenue-sharing entitlement (Entitlement Period 5, July 1, 1974—July 30, 1975) for the Cumberland County Area, without an hypothesized VETE, is $409,751. This is $19.76 on a per capita basis.

THE ALTERNATIVE ENTITLEMENTS

Alternative I

Alternative I is based on the standard conversion ratio of the Insurance Services Office (ISO) rating system, which equates four volunteer firemen to one professional fireman in terms of effectiveness [4]. Presently, the Cumberland County Fire Department has fifty active volunteer firemen. Multiplying by the one-fourth conversion ratio gives the equivalent of 12.5 professional firemen. Multiplying this number by a representative annual salary level ($7,500), yields a total imputed value for voluntary effort of $93,750.

For Alternative I, the GTE, which includes a VETE, is calculated to be .0241. Calculating the allocation gives the Cumberland County Area an entitlement of $456,841. This equals $22.03 of revenue-sharing funds on a per capita basis (Table 2).

Alternative II

Alternative II is based upon Recommendation No. 10 of the New Provisions of the ISO Grading

[2] The Insurance Services Office (ISO) of Tennessee is a private organization supported by insurance companies and regulated by the Tennessee State Department of Insurance. One responsibility of the ISO is to evaluate the performance of fire departments for the purpose of assigning fire insurance rate structures to communities in the state.

[3] Interpretation of Public Law 92-512, 92nd Congress, H.R. 14371, October 20, 1973.

[4] The county area is defined as the geographic area of the unit of local government next to the state level of government. The state government is entitled to receive one third of the total amount of revenue-sharing funds allocated to the state for each entitlement period. The remainder of the state's allocation is distributed among the units of local government within the county areas of the state.

[5] The general tax-effort factor of any unit of local government is the adjusted taxes of that unit of local government divided by the aggregate income. Adjusted taxes are defined as compulsory contributions exacted by a unit of local government for public purposes, excluding that portion of revenues used for educational purposes.

[6] Relative per capita income is measured by the ratio of the state's per capita income to the county area's per capita income.

[7] Population is determined on the same basis as resident population is determined by the Bureau of the Census for general statistical purposes.

TABLE 1. ORIGINAL AND ALTERNATIVE REVENUE SHARING ENTITLEMENTS FOR CUMBERLAND COUNTY AREA

State allocation--5th entitlement period data elements

Total = $120,118,362

State government = 39,970,769

All county areas = 80,147,593

Cumberland County allocation	Original	Alternative I	Alternative II	Alternative III
County area product (CAP)[a]	763.9132	852.3291	944.2816	976.1113
Sum of all CAP's[b]	149,786.9020	149,875.3179	149,967.2704	149,999.0984
Allocation coefficient (AC)[c]	.0051	.0057	.0063	.0065
County area allocation[d] (Dollars)	408,752	456,841	504,930	520,959

[a]CAP = Population × GTE × relative per capita income.
[b]Sum of all CAP's = CAP + sum of all other CAP's (149,022.9888).
[c]AC = CAP/Sum of all CAP's.
[d]County area allocation = the total state allocation for county areas × allocation coefficient.

Schedule, which states that with proper training, equipment and leadership, volunteer and part-volunteer fire departments can perform in an equivalent manner to professional ones [6]. From this recommendation, the ratio of equivalence between volunteer and professional firemen becomes two to one.

Multiplying the number of active volunteers (50) in the Cumberland County Fire Department by the new one-half conversion ratio gives the equivalent of 25 professional firemen. Multiplying this number by the annual salary level of $7,500 gives an imputed value for voluntary effort of $187,500.

For Altnerative II the GTE is estimated to be .0267. Calculating the allocation gives the Cumberland County Area an entitlement of $504,930. This equals $24.35 of revenue-sharing funds on a per capita basis.

Alternative III

Alternatives I and II are concerned strictly with imputing a dollar value to voluntary effort, with no consideration given to level of fire protection services this amount of expenditure could purchase on the market. Alternative III, on the other hand, is concerned with actual replacement value of the voluntary effort, or dollar market value of an equivalent level of fire protection services.

TABLE 2. VOLUNTARY EFFORT TAX EQUIVALENT (VETE), GENERAL TAX EFFORT COEFFICIENT (GTE), TOTAL ALLOTMENT, AND PER CAPITA ALLOTMENT FOR EACH OF THE REVENUE SHARING ALLOCATION ALTERNATIVES

	VETE (Dollars)	GTE[a] Coefficient	Total Allotment (Dollars)	Per Capita Allotment (Dollars)
Original	b	.0216	409,751	19.76
Alternative I	93,750	.0241	456,841	22.03
Alternative II	187,500	.0267	504,930	24.35
Alternative III	217,500	.0271	520.959	25.13

[a]GTE = Total adjusted taxes + VETE/Total income of all residents = $781,709 + VETE/$36,262,017.
[b]No imputed value for voluntary effort.

Alternative III is based on manpower levels needed for equivalent fire protection services, assuming a totally professional fire department, in a system that is set up in the same organizational way as the Cumberland County Fire Department. (Cumberland County is divided into eight fire districts with seven tanker trucks and one "minipumper" attack truck. In the ISO "Specifications for Rural Fire Departments," it is recommended that at least three full-time firemen respond per alarm, per piece of fire fighting apparatus [3]. Full adherence would mean 32 professional firemen.)

Presumably, one off-duty fireman per apparatus can be called back as needed when an alarm is sounded. The duty hours for each fireman would be 24 hours on and 24 off. Every other "off" day would be considered as a stand-by callback period, during which time the firemen would return to duty as needed when an alarm sounded. In total, this system gives three firemen per piece of apparatus on duty, or on call, at all times.

Three of the professional firemen are already paid for by local tax effort. To avoid double-counting these salaries in the local tax effort, the total number of professional firemen counted when determining the VETE is 29. Multiplying the $7,500 annual salary level by 29 gives an imputed value to voluntary effort, based upon a market value equivalent, of $217,500.

For Alternative III, the GTE is estimated to be .0276. Calculating the allocation gives the Cumberland County Area an entitlement of $520,959. This equals $25.13 of revenue-sharing funds on a per capita basis.

CONCLUSIONS

Conclusions from the study are: (1) The increase in the revenue-sharing entitlement due a community could be substantial when voluntary effort for the delivery of public services is considered as a tax substitute and accounted for in the tax-effort coefficient; (2) Measurement of total local-effort community effort needs further development and refinement. Illustrated here are three feasible alternatives for imputing value to the voluntary effort used to deliver fire protection services.

The next step is to consider other tax substitutes, such as user charges, and other public services, such as health care delivery. Costs of developing more refined measures of relative fiscal effort, and applying them to a wider range of public services, are small relative to gains in equity that could be achieved [5]; (3) Reflecting an accepted societal value, the assumption is made in revenue-sharing legislation, that a community should be given federal revenues on the basis of its own effort to help itself. Without assigning a normative judgment to this value, one may conclude that the revenue-sharing allocation formula would provide for a more equitable distribution of federal revenues by including a VETE in the tax-effort coefficient of the allocation formula.

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