EFFECTS OF FORMULAS AND DATA USED ON THE ALLOCATION OF FEDERAL FUNDS

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Billions of dollars in Federal funds are being allocated to State and local governments, deter-termined by statistical data and formulas speci-fied in legislation. Table 1 shows that for the selected thirteen major formula grants shown, fifty billion dollars were obligated during Fiscal Year 1976. This paper will review these selected programs by analyzing the data and formulas used for the allocation of funds by the Federal Government to State and local areas.

The Federal Committee on Statistical Methodology of the Office of Federal Statistical Policy and Standards created a Subcommittee on Statistics for Allocation of Funds with members from various Federal agencies. The purpose of the Subcom-mittee was to analyze data and formulas used for allocation of Federal funds to State and local areas. This Subcommittee issued recently a Report on Statistics for Allocation of Funds 1/ which includes a series of recommendations with regard to the data and formulas used in the allocation of funds. This Report also included a discussion on how errors and inequities in allocations can be reduced. The programs selected here will be analyzed with respect to the recommendations and discussions presented in the Report.

The Advisory Commission on Intergovernmental Relations recently published Categorical Grants: Their Role and Design. 2/ This report includes a series of recommendations; the one on improved allocation procedures is relevant to our present analysis. Another effort now underway is a study by the Center for Governmental Research, Inc., on "Federal Grant-in-Aid Programs: Analysis of the Distributional Effects of Selected Present and Alternative Formulas." 3/ A preliminary report on "A Typology and Review of Federal Categorical Grant-in-Aid Formulas in Fiscal Year 1975" presents the formulas for 147 programs with estimated outlays of $42,534 million in FY 1975.

II. Recommendations on data and formulas

Four recommendations given in the Report on Statistics for Allocation of Funds are relevant to the issue of data and formulas used to allo-cate Federal funds to State and local governments.

It is recommended that specific data series be designated as official statistics. The purpose of this recommendation is to select specific data series for use in fund allocation. To this end, recommendation 6 states:

> That the Office of Federal Statistical Policy and Standards, with the assistance of the statistical agencies, designate a limited number of additional official statistical series for use in funds allocation. These would be kept as current and as accurate as possible for State and for local areas.

The statistics designated as official at present include population statistics (Bureau of the Census, Current Population Reports in Series P-25 and P-26, except when decennial census is more current), labor force and unemployment statistics as published by the Bureau of Labor Statistics and poverty statistics as published in Bureau of the Census Series P-60.

The need for data comparability when distributing funds among competing jurisdiction (e.g, States) must be recognized. However, at different levels of distribution (such as counties rather than States) different data may be available and allocations may be improved by recognizing the differences. Therefore, recommendation 7 states:

> That in tiered allocation programs comparable data should be used for allocation to States, but policy flexibility may be allowed for sub-State allocations. When the Federal Government allows this flexibility, it should be subject to the formulation of specific Federal statistical and administrative guide-lines, concerning the designation of the responsible governmental unit for choosing among statistical series, for declaring the specific types of statistical series from which such a choice is permitted to be made, and for establishing administrative mechan-isms for consideration of appeals from area governments.

The recommendation on goals for data accuracy suggests that large errors should be minimized. Recommendation 8 states:

> That since data errors are inevitable and since statistical resources are necessarily limited, priority be given to minimizing the very large errors which may occur in data used for the allocation of funds.

The objective is to minimize the overall absolute error in the distribution of funds. In this case, the absolute error for areas receiving large amounts of funds must be controlled in order to minimize the overall error in the distribution of funds.

The existence of cutoffs in determining eligi-bility for funds distributed may determine serious problems for areas for which the statistics are close to the cutoff value. Recommendation 9 states:

> That, to minimize the effects of data errors, eligibility cutoffs be such that there is a gradual transition from receiving no alloca-tion to receiving the full formula amount.

Table 1. Federal Funds Distributed by Selected Major Programs to State and Local Areas

Program Title	Catalog of Federal and Domestic Assistance Number	Millions of Dollars in Fiscal Year		
		1976*	(estimate) 1977	(estimate) 1978
Educationally deprived children-local educational agencies...................	13.428	1,625	1,721	1,927
School assistance in Federally affected areas-maintenance and operations.......	13.478	754	768	370
Rehabilitation services and facilities-basic support........................	13.624	900	740	760
Social services for low-income and public assistance.....................	13.642	2,485	2,470	2,401
Medical assistance program............	13.714	10,678	10,229	11,816
Aid to families with dependent children	13.761	7,328	6,213	6,657
Community development block grants/ entitlement grants.....................	14.218	2,471	2,831	2,812
Law enforcement assistance-improving and strengthening law enforcement......	16.502	548	350	284
Comprehensive employment and training programs..............................	17.232	5,903	6,257	8,346
Highway, research, planning and construction..........................	20.205	6,157	7,634	6,545
Construction grants for wastewater treatment works.......................	66.418	4,947	6,600	5,590
General revenue sharing...............	NA	6,355	6,655	6,855
Anti-recession financial assistance....	NA	--	1,699	1,572
TOTAL	--	50,151	54,167	56,935

*Transition quarter included

SOURCE: Financial data are obligations from the 1977 Catalog of Federal Domestic Assistance, 1977 Update, for programs with catalog numbers; otherwise, they are obligations from Budget Appendix, 1978 and 1979.

The problem is that data errors may frequently determine that areas are wrongly classified as eligible or ineligible. If instead of sharp cut-offs the legislation specifies a gradual transition from ineligible to eligible, the problems of wrong classifications can be avoided.

The Advisory Commission on Intergovernmental Relations (ACIR) in its recent publication Categorical Grants: Their Role and Design includes a recommendation on improved allocation procedures which states:

The Commission recommends that grant formula allocations provisions be examined carefully by the appropriate legislative committee of Congress,...., and by the executive departments and agencies, and where desirable and feasible updated to include more precise and specific indicators of program need. The Commission further recommends that a critical review be given to formulas that distribute funds according to total population or equal shares; to minimum and maximum grant entitlements; and to any formula factors that may have inappropriately or unintentionally favored one set of recipients over another.4/

This ACIR recommendation suggests that allocation programs should use statistical indicators specific to the needs of the program.

III. Selected Major Formula Programs 5/

Table 2 gives for selected major programs a brief description of objectives and summary of the formula and data used to allocate the funds. 6/ The further analysis presented is based on this material.

IV. Recommendations given in the light of the data and formulas specified for selected programs

The recommendation that additional "official statistics" be designated in the light of the programs studied shows the need to designate official series on per-capita income. The purpose of designating "official statistics" is to publish those series frequently, as well as to maintain a high quality and consistency of the data series over a period of time.

A problem often encountered with the selected data elements is that they may be available only at the time of the decennial census. For example, urban population is only available from the decennial census and might even become a meaningless statistic during the latter half of the decade. When data are required for small geographic areas, data from current surveys will probably not fulfill these needs. In this case, it would be necessary to rely on Decennial Census

Table 2. Summary Characteristics of Data and Formula Used by Selected Major Programs in Distributing Federal Funds to State and Local Areas 6/

Title - Introduction	Summary of Formula	Data Elements
Medical Assistance Program (Medicaid - Title XIX of Social Security Act; 13.714) The Act provides matching funds for States to purchase medical services for eligible low income individuals and families. Specific administrative expenses are also partially covered.	The "Federal medical assistance percentage" (FMAP) for State i is determined as: $$A_i = 100 - 45 \times \left\{ \frac{PCI_i}{PCI_{us}} \right\}^2$$ $$FMAP_i = \text{Min.} \left[83, \text{Max.} (A_i, 50) \right]$$ Constraints: FMAP $\leq 83\%$ and FMAP $\geq 50\%$	PCI_i: is the per capita income for State i as published by the Bureau of Economic Analysis
Law Enforcement Assistance - improving and strengthening law enforcement. (Title I of the Omnibus Crime Control and Safe Streets Act of 1968 as amended; 16.502) Block grants to States with population based formula: 85% of LEAA part C appropriation and 50% of part E appropriations. Each State must pass-through to local governments a variable % of block grant awards based on State and local expenditures for criminal justice the preceding fiscal year. The amounts for individual jurisdictions are determined by the State Planning Agencies based on applications from the localities (not by LEAA).	1. $\dfrac{P_i}{\sum P_i}$ x Part C appropriations 2. $\dfrac{P_i}{\sum P_i}$ x Part E appropriations 3. Pass through to localities $= \dfrac{\text{Local Expenditure on criminal justice}}{\text{State and local expenditure on criminal justice}}$ x State Allocation	P_i: Bureau of the Census latest State estimates of population. State and local expenditures on criminal justice are collected by the Bureau of the Census in the Survey of of Criminal Justice Employment and Expenditures.
Community Development Block Grants (CDBG; 14.218) This program allocates funds to local areas to provide decent housing and suitable living environment for persons of low and moderate income. (The formulas described refer to March 1977)	80% funds for SMSA's 20% funds for non-SMSA's Hold - harmless provision is phased out in 5 years. Formula used for various phases of the program: $$\frac{1}{4}\left\{ \frac{\text{Area population}}{\text{Larger area population}} \right\}$$ $$+ \frac{1}{2}\left\{ \frac{\text{Area poverty count}}{\text{Larger Area Poverty count}} \right\}$$ $$+ \frac{1}{4}\left\{ \frac{\text{Area overcrowded dwelling units}}{\text{Larger area overcrowded dwelling units}} \right\}$$	**Population:** the most current estimates from the Bureau of the Census **Poverty** from the 1970 Census of Population **Overcrowded dwelling units** from the 1970 Census of Population

Title – Introduction	Summary of Formula	Data Elements

Title – Introduction

Highway research, planning and construction (Title 23, U.S. Code: 20.205)

This is the Federal aid program through which the national and State governments, as partners, construct the principal network of highways throughout the United States.

Summary of Formula

Each program has a separate formula which often specifies a minimum allocation of say 0.5%

For primary systems the formula is:

$$\frac{2}{9}\left\{\frac{A_i}{\sum A_i}\right\} + \frac{2}{9}\left\{\frac{R_i}{\sum R_i}\right\} + \frac{2}{9}\left\{\frac{D_i}{\sum D_i}\right\} + \frac{1}{3}\left\{\frac{UR_i}{\sum UR_i}\right\}$$

Constraint: Minimum State allocation 0.5%

Data Elements

A_i: area of State

R_i: rural population of State from the 1970 Census of Population

D_i: rural delivery is route mileage and intercity mail route mileage certified by Post-master General

UR_i: urban population for places of 5,000 or more, 1970 Census of Population

Other variables used in other programs include data such as (a) urbanized population for places 50,000+, 1970 Census and (b) lane miles in use 5 years or more from State inventory of interstate system.

Anti-recession financial assistance (Title II of the Public Works Employment Act of 1976 as amended by the Intergovernmental Anti-recession Assistance Act of 1977)

General units of government of high unemployment are eligible to receive funds; payments go to about 20,000 eligible governments each quarter. Funds are distributed to State and local areas if the national unemployment rate is greater than 6%.

If national unemployment rate for a quarter is > 6%, then the total dollars distributed is $125 million + $30 million x (No. of .1% above 6% of seasonally adjusted estimate). 1/3 of total dollars are for States, and 2/3 for local governments.

$$\text{State}_i: \quad \left[\frac{(u_i - 4.5) \times \text{State revenue sharing \$}}{\sum \text{of product for all States}}\right]$$

x total State allocation

$$\text{Local}_i: \quad \left[\frac{(u_k - 4.5) \times \text{Local revenue sharing \$}}{\sum \text{of product for all local governments}}\right]$$

x total local allocation

u: unemployment rate during calender quarter as published by the Department of Labor for all States and 4,300 local areas. Other local governments are assigned unemployment rate for next larger unit of government where located. Quarter ending 3-months before payment is appropriate.

Revenue sharing amount is the general revenue sharing allocation for the most recent entitlement period for each recipient government.

SOURCE: See footnote 5.

data, if available, or on administrative records. The use of administrative records may require checking the accuracy of the data and the consistency among the different entitlement areas.

The recommendation on tiered allocation, possibly using different data series for different levels of allocation has in fact already been used in selected programs.

For example, Title I of ESEA computes the allocation to the county level; the allocation for the local education authorities (LEA) is determined by the State education authority, based on requests from the LEA's. In the General Revenue Sharing (GRS) program, the allocation to States uses different data elements and formulas from those used to determine allocation to counties and local governments. The Law Enforcement Assistance Administration (LEAA) gives block grants to States. A variable percentage of the State funds, based on specifications given in the law, in this case, expenditures on criminal justice, must be passed on to the local governments. However, the dollar amount given to individual jurisdictions is based on applications from the localities to the State Planning Agencies (SPA). The final amounts given to the local jurisdictions is determined by the SPA and not by LEAA. The legislation which establishes that the final allocation to local areas be determined on the basis of administrative decision recognizes that often current reliable data for small areas are not available; at the same time, the needs of individual areas could be evaluated in terms of projects to be carried out.

The recommendation on data accuracy emphasizes the need to minimize large errors, those that may have a large impact on the allocation of funds. In addition, a maximum acceptable relative error would have to be established for all areas to which competing funds are distributed. This would suggest that, for example, large States which will probably receive large allocations need better data than smaller States. In terms of the overall accuracy of the data, we often do not know the accuracy of the data elements for each State. However, for sampling errors, it is known that areas with smaller samples will have a higher sampling error than those with larger samples. Problems of undercount of the population in the decennial census may be related to such factors as the racial/ethnic composition of the population for the area and to the urban/rural distribution of the population, as well as to the extent of urban areas "difficult to enumerate". Although various coverage-improvement procedures will be implemented for the 1980 Census, these procedures will not necessarily guarantee a more accurate population count for large areas. In fact, the plans for the 1980 Census include a program for evaluation of coverage. This evaluation effort would provide estimates of undercount which might be used to adjust the 1980 Census counts published on December 1, 1980, which are the ones used for apportionment of congressional seats. These adjusted figures would probably not be available until 1982 or

1983, but they might provide improved estimates of population for the rest of the decade.

For small areas where current reliable statistics might not be available, administrative discretion may be given to a higher level of government (county or State) for determining the allocation. For example, Anti-Recession Financial Assistance Program uses unemployment estimates published quarterly by the Bureau of Labor Statistics for the States and 4,300 local areas. Areas not among the 4,300 are assigned the unemployment rate of the next largest unit of government which includes them.

Eligibility cutoffs, it was recommended, should be avoided; gradual transitions from receiving no allocation to receiving a full amount is recommended. Many of the programs received have minimum and maximum amount of benefits. CETA, Title II, however, contrasts with Title VI. In Title II an area is eligible if its unemployment rate is above 6.5% for three consecutive months; this is a sharp eligibility cutoff for which it is difficult to provide adequate data. Title VI, on the other hand gives 25% of its funds in proportion to the unemployment in excess of 4.5%. Therefore, areas with unemployment below 4.5% are not eligible to receive any funds from this provision.

The recommendation by ACIR on improving provisions for the allocation of funds urges that in revising legislation "more precise and specific indicators of program need..." be included. Some programs reviewed here do include some indicators specific to the program. For example, the Highway Research, Planning and Construction Program includes indicators such as "route mileage and intercity mail route mileage", and "lane miles in use five years or more from the State's inventory of interstate system". The construction grants for wastewater treatment works include various measures of need based on a "Needs Survey" which determines State-by-State costs of construction of various components of publicly owned wastewater facilities.

ACIR also suggested a critical review of those formulas in which distribution of funds is based on population, and of minimum and maximum grant entitlements. Many programs use population as a factor, although often it is not total population but a specified subgroup of the population. If urban or rural population is specified, the data are available only at the time of the decennial census. State population is estimated during the decade, but the undercount of the population in the decennial census is not adjusted for in estimating intercensal population. The use of maximum or minimum entitlements is quite often specified in legislation. For example, the Medical Assistance Program specifies a maximum reimbursement rate of 83% and a minimum one of 50%. In GRS, the entitlement of a local government cannot be more than 145% of the per capita State entitlement, nor less than 20%. These constraints establish certain discontinuities which affect the funds distributed. The 20% floor on GRS in fact gave money to local governments which actually had limited administrative functions.

V. Analysis of the problems

In summary, the following suggestions are made for the data and formulas to be specified in allocation programs.

The designation of other "official data series" is recommended because the quality and timeliness of such data series can be better monitored. Legislation should designate, whenever appropriate, the use of official data series.

The size of the area for which statistical estimates are required versus the availability of these estimates must be considered. For example, at the time of the decennial censuses data are available for small geographic areas for the characteristics covered in the census. However, in 1978 the 1970 Census estimates are not current and their use in allocation of funds might be inadequate. Intercensal estimates are only available for selected series. Prospectively, the 1985 mid-decade census will provide small area data five years after the decennial census.

The formulas specified in the programs reviewed here are either additive or multiplicative, including some factors squared. The formulas often include constraints, like maximum or minimum benefits. For additive formulas each factor may be given equal weight or different weights. The selection of the weights involves difficult decisions. In multiplicative formulas, errors in any factor affect the total allocation. A compromise is often arrived at in Congress and two formulas are used to determine the allocation. For example, in calculating the allocation to States, GRS computes the House formula (which is additive using five factors), and the Senate formula (which is multiplicative using three factors), and then chooses the higher of the two allocations. These values are subsequently prorated to conform to the total entitlement. There might be a case that a given State receives less than the lower amount of the formulas initially computed.

When the Congress establishes a minimum or maximum benefit, the possible effects of such constraints should be realized. Minimum benefits may raise the actual program possibilities for small units of government which have limited activity. Maximum benefits may possibly restrain fulfilling even the real needs of other beneficiaries. In addition, the cutoffs which establish eligibility of governmental units may result in excluding some potential beneficiaries from receiving funds because of data errors, and others may receive benefits they might not in reality be entitled to. Such inequity might be counterbalanced by gradual transitions between receiving no benefits and receiving full benefits.

The distribution of funds to small areas requires data for these areas. Such data are not often available on a current basis since large costly sample surveys would be required. Four alternatives are: 1) to use census information—which may not be current; 2) to use data for larger geographic areas in which the small areas are located—which may not be appropriate; 3) to use statistical data based on administrative records—a method which needs to be further explored; 4) to allow allocation to be based on—possibly arbitrary—administrative decisions originating from requests of the small areas involved and constrained by the total funds available. The advantages and disadvantages of each alternative need to be evaluated to determine the best choice.

Footnotes

1/ Subcommittee on Statistics for Allocation of Funds, Federal Committee on Statistical Methodology, Report on Statistics for Allocation of Funds, issued by the Office of Federal Statistical Policy and Standards, Government Printing Office, Washington, D.C., 1978.

2/ Advisory Commission on Intergovernmental Relations, Categorical Grants: Their Role and Design, U.S. Government Printing Office, Washington, D.C., 1978.

3/ Center for Governmental Research, Inc., "Federal Grant-in-Aid Programs: Analysis of the Distributional Effects of Selected Present and Alternative Formulas", Rochester, New York, 1978.

4/ ACIR, op. cit., p. 314

5/ These descriptions are based on program descriptions prepared by OMB for Congressman Fascell and by the case studies included in the Report on Statistics for Allocation of Funds. I would like to thank Lawrence Hush, OMB, for making the descriptions available to me.

6/ A complete version of Table 2, including the 13 programs given in Table 1, can be obtained by writing to Maria E. Gonzalez, Office of Federal Statistical Policy and Standards, Department of Commerce, Washington, D.C., 20230.