PER CAPITA EXPENDITURES BY UNITS OF LOCAL GOVERNMENT: IMPLICATIONS FOR REVENUE SHARING

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The concept of revenue sharing is not new. Revenues obtained
through national taxes have been shared with provincial or state govern-
ments in Canada and the United States in varying degrees throughout their
respective histories.[1] Similarly, revenue sharing from provincial or
state governments to units of local government that they include is of
long standing. Current interest has been heightened in the United States
by passage of the State and Local Fiscal Assistance Act of 1972, allo-
cating thirty billion dollars over five years for general expenditure
categories.

The rationale for revenue sharing between levels of government
(from higher to lower) is that revenues can be collected more efficiently
by the higher unit of government, but for some public goods, local govern-
ments are both in a better position to determine local needs and potential-
ly more accountable to their constituents. For many, local control as
an intermediate goal has much intuitive appeal.

If one grants the assumption that provision of certain public
services may be more efficiently administered through revenue sharing,
the question remains of how (on what basis) revenues should be shared.
I do not propose to answer this question in this paper. Rather, I would
like to discuss some of the issues involved in revenue sharing in rela-
tion to previous analyses of state and local government expenditures and
preliminary results from research in progress. I apologize to our

Canadian hosts at the outset for centering my attention on the United States experience.

Previous Research

There has been a large number of studies on state and local expenditures on public services.[2/] My approach here is to highlight the findings and conclusions of a few of these, including the most recent ones of which I am aware. Each of these studies focused on the major functional expenditure categories for state and local governments. There are many studies on individual public services, but I will not attempt to review them here. One reason for this choice is that I wish to focus on general revenue sharing. Another is that there may be important substitution possibilities between public services. I will return to the latter point.

Fabricant (1952) was perhaps the first writer who attempted statistically to explain the variability of governmental expenditures at the state and local level using multivariate analysis. He used multiple regression analysis on 1942 data with the forty-eight states as the units of observation. He found that with three variables he could account for 72 percent of state-to-state differences in per capita operating expenditures in total, and from 29 to 85 percent for various functional classes. His explanatory variables were per capita income, population density, and percent of population living in urban areas. The signs for the regression coefficients were positive in each case, and he concluded that income difference was the primary cause of spending difference.[3/]

Fisher (1964) analyzed 1960 data at the state level for thirteen expenditure categories. He used three types of explanatory variables: economic, demographic, and sociopolitical. He accounted for 19 to 80 percent of the variation in these expenditure categories. Demographic variables were most important for expenditures on education, public welfare, police, fire, and general control. Economic variables were the most important for all other functions. He concluded that the percent of families with low incomes was an important explanatory variable, with a negative sign.[4]

Sacks and Harris (1964) concluded that explained variation in state and local expenditures could be increased by introducing state and federal aid as a variable, using 1957 and 1960 data.[5] I do not think it is correct to use this variable for this purpose. I will return to this point later in my discussion. Each of the following studies makes use of an intergovernmental revenue variable which is subject to the same reservation.

Bahl and Saunders (1966) used 1903, 1942, 1957, 1960, and 1962 data and related changes in government expenditures to changes in selected independent variables. They concluded that changes in the levels of federal aid and in income have the most pronounced effect on changes in government expenditures at the state and local level. They found that changes could be more meaningfully estimated if a more nearly homogenous income-density group of states is analyzed. They also found a different response for different functional expenditures to the same variables.[6]

Henderson (1968) used 1957 data at the county level. He analyzed the metropolitan counties (the one hundred largest, in terms of population) separately from the 2980 remaining counties with data. Using two-stage least squares, he accounted for 65 percent of the variation in total local governmental expenditures in metropolitan counties, and 55 percent in non-metropolitan counties. The signs for the variables he used--income per capita, intergovernmental revenue, and population-- were all positive, except for population in non-metropolitan counties.[7]

Scanlon and Strauss (1972) used 1962 data at the county level, dividing the counties, in much the same fashion as Henderson, between urban and rural. They also separated the data into four regions: North-East, North-Central, South, and West. Population, income per capita, and intergovernmental revenue per capita were used as variables to explain total expenditures per capita. The equations explained from 14 to 86 percent of the variation, with the best fit occurring for the North-East urban region and the worst for the South rural region. They concluded that the region is important as a control variable and inter- preted the intergovernmental revenue per capita regression coefficient (which had a positive sign) to show the amount of local response to intergovernmental revenue.[8]

Ohls and Wales (1972) used state level data for 1968 and analyzed expenditures on three categories of services--highway, education, and local services. They found that they could explain 68 to 83 percent of the variation in per capita expenditures for these categories. Sig- nificant variables for local services were percent of state's population in non-metropolitan areas, population density, change in population,

income per capita, and federal grants per capita, all with positive
signs. Population was a significant variable, with a negative sign.[9]

A summary of these research studies in such a few sentences does
not do them justice, but I hope I have been able to convey a flavor of
the approaches taken and the resulting conclusions. Of the seven studies
reported, five used the state as the unit of observation, and two used
the county. The studies were comprehensive for the United States. Al-
though many of the services are provided by municipalities, unfortunate-
ly data at this level are less available for analysis.[10]

The findings of the five studies (from Sacks and Harris on) in-
cluding an intergovernmental revenue variable should, it seems to me,
be viewed with caution. If intergovernmental revenue is not indepen-
dent of other variables that are specific to local expenditures, then
it is not correct to treat such revenues as if they are independent.
In fact, as Fisher argues, the causation may be in the opposite direc-
tion, as when intergovernmental revenues require matching local funds.[11]
The appropriate test is to determine if the differences in the level of
intergovernmental revenue can be explained by differences in other speci-
fic local variables which in turn explain local governmental expenditures.
This is the approach I have taken in the research now underway, on which
I report in the following section.

Preliminary Results from Research in Progress

The findings of previous research suggest that geographic region
of the country is important. Perhaps as important in viewing variation
in expenditures by units of local government are the institutions which

have been developed for providing public services which differ among
states. Thus, if one state provides a service such as public welfare
assistance directly to its citizens which is administered through units
of local government in another state, then this fact will be reflected
in differences in expenditures at the county level of aggregation.

I have done preliminary work on variation in expenditures for all
units of local government at the county level of aggregation for Cali-
fornia and Illinois. The California analysis was undertaken as an ex-
tension of work already completed on projections of local government
expenditures in each of five counties.[12/] Meetings with local govern-
ment officials in these counties suggested an interest in gaining a
better understanding of variations in expenditures among counties. The
Illinois analysis was undertaken to find consistencies and inconsisten-
cies with the California results, and to suggest hypotheses to be tested
when the next set of data on local government expenditures becomes
available.[13/]

I wish to stress that the findings at this point are preliminary,
but that they are suggestive of conclusions in relation to previous
studies, particularly with respect to revenue-sharing. The expendi-
ture data are from the 1962 and 1967 Census of Governments.[14/] The
data are by county areas, and include both current and capital expen-
ditures of township, special district, municipal, and county govern-
ments. Regressions were computed for four alternative dependent varia-
bles: (1) total local government expenditures per capita; (2) local
government expenditures on education; (3) local government expenditures

on public welfare; and (4) the ratio of revenue from local sources to the total of local, state, and federal revenues of local governments. The variable definitions are as follows:

Y_1 = total local government expenditures per capita

Y_2 = local government expenditures per capita on education

Y_3 = local government expenditures per capita on public welfare

Y_4 = ratio of revenue from local sources to total of local, state, and federal revenues of local governments

X_5 = total county population

X_6 = population density per square mile

X_7 = percent of county population in incorporated areas

X_8 = per capita personal income in county

X_9 = ratio of sum of property and proprietors' income to total personal income in county

X_{10} = per capita market value of taxable property in county

X_{11} = percent of county population 0-18 years

X_{12} = percent of county population 65 years and older

X_{13} = SMSA dummy variable, 0 if non-SMSA county and 1 if SMSA county

X_{14} = percent of households with less than $5000 income

X_{15} = percent of labor force in manufacturing employment

X_{16} = percent of labor force in white-collar employment

Because of time limitation, I present only the results for total expenditures and for the ratio of local revenue to the total revenue of local governments. All regressions reported are linear in the original variables.[15/] The California and Illinois results are not directly comparable because the variables used do not all correspond at this time.

The purpose here is not to present finalized conclusions, but rather to suggest additional dimensions for analysis.

Table 1 gives regression results for total expenditure per capita by units of local government in California. Two indications from this table are (1) the only variable with a significant coefficient is the per capita market value of taxable property, and (2) the R^2 decreases from 1962 to 1967. Income per capita and the other five variables included in Tables 2 and 3 were tried in alternative equations, but no significant relationships were indicated. It is interesting to note in Table 2 and Table 3 that the simple relationship between the per capita market value of taxable property and per capita personal income is negative, although weak. One might expect the association between individual functions, such as education, and characteristics of the population to be stronger than for the total of all expenditures. This was not the case for California although it was for Illinois.

Table 4 gives the results for the ratio of local revenue to the total of local, state, and federal revenue sources of local governments for California. These results indicate that (1) several variables are significantly related to this ratio, although per capita market value is not as strongly associated as for total expenditures per capita, and (2) a significant amount of the variation in this ratio is associated with variation in these variables, with a slight increase from 1962 to 1967.

Illinois results for total expenditures per capita are given in Table 5. With the variables used here, only per capita income had a significant coefficient in 1962, and the percent of workers in white

collar employment in 1967. Estimates of income per capita were not available at the time of these computations for the 1967 regression, but it is interesting to note that the percent of households with less than $5000 income did not have a significant coefficient.[16/] The simple correlation coefficients for Illinois in 1962 and 1962 are given in Tables 6 and 7.

Regression results for the ratio of local revenue to the total of all revenues of local governments in Illinois are given in Table 8. The indications emerging from these results are: (1) per capita income and percent of households with less than $5000 income are significant variables when used in 1962 and 1967 regressions, respectively; (2) other significant variables in 1967 are percent of population 0-18 years and the percent of workforce in white collar and in manufacturing employment; (3) the R^2 indicates a significant proportion of the variance in the ratio of local revenue to the total revenue of local governments is related to these variables.

Revenue Sharing Implications

The findings to date suggest (Table 4 and Table 8) that differences in the proportion of revenues of local government that is received from state and federal sources are systematically related to other character- istics of the populations these governments serve. This suggests that it is not correct to use nonlocal revenues as an explanatory variable for local government expenditures. More importantly, inferences drawn from those studies with respect to responsiveness of expenditures and for revenue sharing based on this variable appear to be specious. That is,

if other variables can be used to explain the proportion of funding coming from outside, then the coefficient for this variable can hardly be given much significance.

In refining the analysis of expenditures, I plan to use additional variables, compute regressions for specific functions such as police and fire protection, for groupings of counties, and for changes between census periods. There are arguments for analyzing specific functions such as police protection and parks and recreation, because one might expect to explain specific functions in greater detail than an aggregate of functions. On the other hand, there may be substitutions or complementarity between functions, as when improved roads result in less need for hospital services.[17/] It also seems plausible that changes over time are important considerations in revenue-sharing as well as in expenditures. For example, rapid population growth or decline may imply more than proportionate changes in per capita governmental expenditures.

In Canada, revenue-sharing grants are aimed at explicit revenue equalization, as the objective is to allow all provincial governments to provide services to citizens at an average level. In the United States, equalization is implicit because a progressive income tax collected disproportionately from residents of rich states is distributed according to population of states.[18/] The U.S. formula is based on two other factors besides population. These are personal income (as a measure of fiscal capacity) and taxes collected by the governments in the state.[19/] These two variables are used to compute tax effort.

States must use these three factors in the distribution of the revenues under the 1972 Act, but may adopt different weightings for the factors.

One should note that citizens of states and cities with income taxes are rewarded in two ways: once through itemized deductions on federal income tax and then through revenue sharing. Perhaps this is as it should be, but certainly an incentive is provided for increasing the output of state and local public goods relative to private goods.[20]

Many criteria are involved in deciding upon the pattern of government services and their financing.[21] There are arguments for simple formulas of revenue allocation.[22] One strong argument is political acceptability. But it seems reasonable to attempt to better understand past expenditures in deciding formulas for the future.

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[1] James A. Maxwell, "Revenue Sharing in Canada and Australia: Some Implications for the United States," National Tax Journal, June 1971, p. 251 f.

[2] Sixty-six studies are reviewed in R. W. Bahl, "Studies on Determinants of Public Expenditures: a Review" in S. J. Muskin and J. F. Cotton, Functional Federalism: Grants-In-Aid and PPB Systems (Washington D.C.: State-Local Finances Project of George Washington University, 1968).

[3] Solomon Fabricant, The Trend of Government Activity in the United States Since 1900, National Bureau of Economic Research, 1952.

[4] Glenn W. Fisher, "Interstate Variation in State and Local Government Expenditure," National Tax Journal, March 1964.

[5] Seymour Sacks and Robert Harris, "The Determinants of State and Local Expenditures and Intergovernmental Flows of Funds," National Tax Journal, March 1964.

[6] Roy W. Bahl and Robert J. Saunders, "Factors Associated with Variations in State and Local Government Spending," Journal of Finance, Sept. 1966.

[7] James M. Henderson, "Local Government Expenditures: A Social Welfare Analysis," Review of Economics and Statistics, May 1968.

[8] William J. Scanlon and Robert P. Strauss, "The Geographic Heterogeneity of Public Expenditure Functions," Review of Economics and Statistics, May 1972.

[9] James C. Ohls and Terence J. Wales, "Supply and Demand for State and Local Services," Review of Economics and Statistics, Nov. 1972.

[10] A recent Ph.D. dissertation by Morris brings together results from several studies on individual services to derive estimates by size of city. Douglas E. Morris, Economies of City Size: Per Capita Costs of Providing Community Services, Oklahoma State University, May, 1973.

[11] Glenn W. Fisher, op. cit. Furthermore, if a significant part of expenditures per capita come from outside, then using this part to explain the whole is not statistically justifiable. In California and Illinois in 1967, state and federal aid accounted for 38 and 25 percent of the revenue of local governments, respectively.

12/ George Goldman, Marion O'Regan, and L. T. Wallace, "Estimates of Local Government Expenditures and Revenues for Lake, Marin, Mendocino, Napa and Sonoma Counties for 1975 and 1980," Agricultural Extension Service, University of California, Berkeley, January 1972. I would like to thank these authors for their cooperation while I was at the University of California from January to June, 1972 on sabbatical leave.

13/ I would like to express my appreciation to Scott Shearer for his assistance on this study.

14/ The next Census of Local Governments will be for fiscal 1972.

15/ Logarithmic regressions were also tried, but the results were not improved as they were for Kurnow. See Ernest Kurnow, "Determinants of State and Local Expenditures Reexamined," National Tax Journal, Sept. 1963.

16/ Fisher found that he could explain as much variation with the percent of households less than $3000 as he could with per capita income in his analysis of state variations. See Glenn W. Fisher, op. cit.

17/ In analyzing specific functions, Fisher found support for the hypothesis of substitution between functions. See Glenn W. Fisher, op. cit.

18/ See James A. Maxwell, op. cit.

19/ Manvel argues that personal income is not a good measure of fiscal capacity. See Allen D. Manvel, "Differences in Fiscal Capacity and Effort: Their Significance for a Federal Revenue-Sharing System," National Tax Journal, June 1971, p. 193 f.

20/ See Darwin G. Johnson and Charles M. Mohan, "Revenue Sharing and the Supply of Public Goods," National Tax Journal, June 1971, p. 157 f.

21/ See Carl S. Shoup, Public Finance (Chicago: Aldine Publishing, 1969) Chapter 2.

22/ Simons argued that each state should receive the same fraction of revenue collected from its taxpayers by the federal income tax. See Henry C. Simons, Personal Income Taxation (1938) p. 214 f.

Table 1
Regression results, total expenditure
per capita by local governments, California counties, 1962 and 1967

	1962	1967
a_o - Constant term	135.8590	162.0667
X_7 - % of county population in unincorporated areas	-.1381 (.4179)	.3254 (.8111)
X_9 - $\dfrac{\text{(property and proprietor income)}}{\text{total personal income}}$	-44.8901 (106.3693)	-311.3226 (213.2401)
X_{10} - Per capita market value of taxable property in county	.0133** (.0013)	.0152** (.0024)
X_{11} - % of county population 0 - 18 years of age	3.1486 (3.5762)	6.5334 (7.0367)
X_{12} - % of county population	-1.4557 (4.0969)	-3.2017 (8.1278)
R^2	.75	.57
n	58	58

**Significantly different from zero at .05 level.

Table 2
Matrix of Simple Correlation Coefficients (r) for
Study Variables, California Counties, 1962

	Y_2	Y_3	Y_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
Y_1	.50	.27	-.22	-.11	-.09	.38	.10	.05	.86	-.02	-.08	-.28
Y_2	-	-.31	.01	-.01	-.25	-.07	.41	-.29	.33	.22	-.44	.21
Y_3		-	-.35	-.16	-.10	.50	-.44	.42	.28	-.14	.59	-.52
Y_4			-	.24	.26	-.48	.48	.18	-.08	-.08	-.10	.25
X_5				-	.18	-.43	.33	-.21	-.15	-.10	-.10	.36
X_6					-	-.43	.45	-.08	-.10	-.42	.10	.24
X_7						-	-.62	.08	.47	-.02	.21	-.64
X_8							-	-.06	-.01	-.19	-.23	.48
X_9								-	.09	.12	.29	-.33
X_{10}									-	-.16	.05	-.33
X_{11}										-	-.67	-.02
X_{12}											-	-.32
X_{13}												-

Table 3
Matrix of Simple Correlation Coefficients (r)
For Study Variables, California Counties, 1967

	Y_2	Y_3	Y_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
Y_1	.72	.31	-.16	-.15	-.04	.39	-.24	-.06	.71	-.01	-.06	-.29
Y_2	-	.16	-.11	-.08	-.16	.20	-.17	-.29	.50	.12	-.30	-.05
Y_3		-	-.35	-.09	.06	.26	-.17	.19	.10	.04	.11	-.27
Y_4			-	.16	.17	-.34	.38	.36	.17	-.04	-.08	.24
X_5				-	.18	-.43	.35	-.20	-.18	-.03	-.15	.38
X_6					-	-.42	.60	-.03	-.03	-.41	.09	.26
X_7						-	-.63	.01	.49	-.09	.36	-.67
X_8							-	.10	-.23	-.14	-.20	.52
X_9								-	.14	.07	.28	-.29
X_{10}									-	-.26	.19	-.35
X_{11}										-	-.71	.06
X_{12}											-	-.40
X_{13}												-

Table 5
Regression results for Illinois counties, total expenditures per capita by local government

	1962	1967
Constant term	102.60	76.90
X_{11} - % of county population 0-19 years of age (0-18) for 1967	23.30 (45.30)	140.20 (175.80)
X_{12} - % of county population 65 and over	2.10 (121.70)	215.40 (241.40)
X_8 - Per capita income	.0375** (.0070)	-- --
X_{14} - % of households with income of less than $5,000	--	.7827 (.8757)
X_{15} - % in manufacturing employ	-.54 (.35)	-.38 (.67)
X_{16} - % in white collar employ	.46 (.46)	.11** (.92)
R^2	.32	.09
n	102	102

**Significantly different from zero at .05 level.

Table 4

Regression results, ratio of local revenue to total
of local, state and federal sources of revenue, California counties, 1962 and 1967

	1962	1967
a_o - Constant term	.9473	.7208
X_7 - % of county population in unincorporated areas	-.0016** (.0005)	-.0016** (.0005)
X_9 - (property and proprietor income) / Total personal income	.3131** (.1180)	.3979** (.1405)
X_{10} - Per capita market value of taxable property in county	.000000 (.000001)	.000003* (.000001)
X_{11} - % of county population 0-18 years of age	-.0075* (.0040)	-.0039 (.0046)
X_{12} - % of county population 65 years and older	-.0079* (.0045)	-.0052 (.0054)
R^2	.35	.38
n	58	58

* Significantly different from zero at .10 level.

** Significantly different from zero at .05 level.

Table 6
Matrix of Simple Correlation Coefficients (r) for
Study Variables, Illinois Counties, 1962

	Y_1	Y_2	Y_3	Y_4	X_8	X_{11}	X_{12}	X_{15}	X_{16}
Y_1	-	.67	.16	.45	.53	-.04	-.29	.18	.29
Y_2		-	-.15	.51	.60	.04	-.28	.24	.07
Y_3			-	-.41	-.14	-.06	.04	-.11	.12
Y_4				-	.67	-.05	-.41	.37	.19
X_8					-	.06	-.51	.56	.39
X_{11}						-	.47	.07	-.05
X_{12}							-	-.53	-.50
X_{15}								-	.27
X_{16}									-

Table 7
Matrix of Simple Correlation Coefficients (r) for
Study Variables, Illinois Counties, 1967

	Y_1	Y_2	Y_3	Y_4	X_{11}	X_{12}	X_{14}	X_{15}	X_{16}
Y_1	-	.72	.33	.04	-.11	.14	.15	-.19	.09
Y_2		-	.28	.03	.15	-.02	.02	-.07	.01
Y_3			-	-.33	-.16	.10	.10	-.14	.18
Y_4				-	.23	-.39	-.53	.34	.07
X_{11}					-	-.53	-.54	.55	.08
X_{12}						-	.83	-.66	-.59
X_{14}							-	-.73	-.59
X_{15}								-	.27
X_{16}									-

Table 8
Regression results, ratio of local revenue to total
local, state, and federal sources of revenue, Illinois counties, 1962 and 1967

	1962	1967
Constant term	.6450	1.5769
X_{11} - % of county population 0-19 years of age (1967-0-18)	-.0174 (.1027)	-.6175** (.2766)
X_{12} - % of county population 65 and over	-.3432 (.2757)	-.2516 (.3799)
X_8 - Per capita income	.0001102** (.0000159)	-- --
X_{14} - % of households with less than $5,000 income	-- --	-.0088237** (.0013783)
X_{15} - % manufact. employ.	-.00048 (.00079)	-.00211* (.00106)
X_{16} - % in white collar employ.	-.00165 (.00105)	-.00703** (.00146)
R^2	.48	.44
n	102	102

*Significantly different from zero at .10 level.

**Significantly different from zero at .05 level.