Government Expenditure Levels: Alternative Procedures for Computing Measures

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A Measurement Note

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■ **Abstract** *Measurement of government expenditure levels depends not only on good accounting but also on appropriate procedures for computing the measures. This article examines alternative ways of computing measures of expenditure levels, and compares several different measures, using data on government overhead expenditures for California cities with population of 50,000 or more. The results demonstrate the importance of choosing an appropriate measure and the potential for per capita expenditures to yield misleading results.*

Government expenditure levels provide a battleground for political dispute. Recurring charges of "government fat" and "bureaucratic waste" pervade American political rhetoric. Tax and spending limitation proposals, spurred by the success of California's well-known Proposition 13, attest to the serious consequences these themes may pose for state and local government. Such political controversy heightens the importance of research concerning government expenditure levels. This study does not address problems of noncomparable accounting procedures that can invalidate comparisons of expenditure levels, but instead focuses on alternative ways of computing expenditure-level measures.

Expressing expenditure amounts on a per capita basis is the most common method for computing expenditure-level measures. Besides their use by "reformists" interested in comparing jurisdictions in order to identify governmental profligacy, per capita expenditure measures have long been used in research on state and local finance. For example, research on the determinants of government expenditures has often used per capita expenditure measures as the dependent variables. Similarly, research on the fiscal capacity of state and local government has extensively employed per capita personal income as a capacity measure.

Expenditure-level researchers can learn from the fiscal capacity research: dissatisfied with per capita personal income as a measure of fiscal capacity, researchers worked hard at developing better measures. As Cohen states, per capita personal income "does not accurately reflect a state or local government's ability to raise revenues" (1989, 15). Consequently, through a research program at the Advisory Commission on Intergovernmental Relations (ACIR), alternative fiscal capacity measures were developed based on the revenue that would result from applying a uniform set of tax rates to each jurisdiction (1987; Cohen 1989). Similarly, expenditure-level researchers need not limit themselves to per capita measures, but can develop better measures for their research purposes.

Standardizing Procedures for Meaningful Comparisons

The problem of how to construct expenditure-level measures lies in developing standardization procedures appropriate to the research purpose, thereby facilitating meaningful comparisons. In analyzing expenditure levels over time we obviously need to adjust for inflation (see Beck 1985). In analyzing expenditure levels across jurisdictions, we confront deeper issues since expenditure variations across jurisdictions result from variations in jurisdictions' needs, economics, and pol-

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itics. The key to the standardization procedure lies in recognizing what variations we should remove by standardizing in order to make meaningful comparisons, all else remaining the same.

For example, if we desire to take into account the varying service needs of the jurisdictions we are comparing, the appropriateness of a per capita measure depends on whether population size adequately represents needs for that service. Sometimes we may have a better proxy for service need, such as the size of the specific population targeted by the service. On the other hand, if we desire to compare jurisdictions taking into account varying fiscal capacity, we might express expenditures relative to personal income or to some better proxy for fiscal capacity. Some factors we may not want to remove by standardizing. For example, although expressing expenditures relative to service levels generates useful cost-effectiveness ratios for program evaluation, from the expenditure-level measurement perspective, different service levels simply provide a possible explanation of differences. In short, we should choose the expenditure-level measure based on the appropriateness of measuring expenditures relative to need, to resources, or to another factor.

Alternative Statistical Standardization Procedures

Although computing expenditures per capita remains the most common way of statistically standardizing expenditure-level measures, alternative standardization procedures appear occasionally. Some government expenditure statistics are expressed as expenditures per $1,000 of personal income (Census Bureau 1990, Table 31; Tax Foundation 1988, 178), and the ACIR publishes state rankings on expenditures as a percent of state personal income (1988, Tables R1-R14). Hughes and Laverdiere (1986) examined several ways of computing measures using "allocation ratios," the percentage of funds allocated to a particular expenditure category. The field of education commonly uses a target-group standardized measure—expenditures per pupil. Interestingly enough, research on determinants of educational expenditures has generally found that "statistical relationships are sharper and more plausible when the variable chosen for analysis is school spending per student...rather than a per capita measure" (Deacon 1980, 24).

Development of crime statistics has faced similar issues concerning the appropriate statistical standardization procedures. Although per capita crime measures still dominate, crime statistics researchers have done substantial work at developing alternative measures. For example, Cohen, Kaufman, and Gottfredson (1985) computed burglary rates based on number of households and automobile theft rates based on number of registered automobiles. Skogan (1978) showed how a ranking of cities on motor vehicle thefts standardized by population could differ dramatically from a ranking on such thefts standardized by number of vehicles. Stipak (1988) explored a variety of statistical procedures for constructing standardized rates, including standardizing by several variables simultaneously, using regression analysis. Boggs (1965) and Phillips (1973), in addition to Stipak, have made statistical comparisons of alternative crime rate measures.

Because research such as that on crime statistics has demonstrated that alternative standardization procedures can yield strikingly different results, the implications of the choice of procedure for constructing government expenditure-level measures deserves closer attention. Overreliance on per capita measures could seriously mislead. For example, the research on alternative measures of fiscal capacity has found per capita income to correlate as low as about .3 with alternative measures—generally considered by fiscal capacity researchers as superior measures (see ACIR 1987, 12). The remainder of this article will explore the differences resulting from several alternatively standardized measures of government expenditures.

Data

For purposes of this study, a database was created for California cities with population of more than 50,000. Expenditure data for general government operating costs, fiscal year 1984-85, were obtained from the office of the California state controller. Other city data were obtained from the Census Bureau, including total persons, 1986; total income per capita, 1985; and total city expenditures, 1984-85 (1988, Table C, items 3, 36, 111).

The expenditure category of general government was chosen to illustrate the statistical issues involved in computation of alternative measures of expenditure levels. General government operating expenditures include management and support expenditures (city, financial, and personnel administration), which constitute about four-fifths of general government expenditures; and legislative expenditures (city council, attorney, clerk, and auditor). This category was chosen as an interesting example, since it encompasses the range of expenses for government overhead that those attacking government fat and bureaucratic waste may have in mind. Despite some noncomparability in accounting procedures across jurisdictions that make conclusions about specific cities problematic, these data facilitate investigating how much difference results from the choice of the statistical standardization procedure.

These data offer the additional advantage of allowing comparison with a recent study of expenditure levels of California cities that used only per capita measures (Bernick 1990). Bernick identified large variations among California cities in reported per capita expenditures for administrative overhead and for public safety, and went on to single out "fat cities."

Alternative Measures of Government Overhead

The data were used to create three alternative measures of spending levels for government overhead. General government operating expenditures were standardized in three ways, as follows:

- expenditures per capita,
- expenditures per $1,000 personal income, and
- expenditures as a percent of all city expenditures.

These three measures differ greatly in concept. The most commonly used type of measure, the per capita measure, seems of questionable conceptual merit since government overhead expenditures are not for direct services to the population. Justifying the per capita standardization must therefore fall back either on tradition or on using population as a general indicator of size. The expenditures per $1,000 of personal income measure expresses expenditures relative to the jurisdiction's resources; this is equivalent to expressing expenditures per capita relative to mean personal income. This measure has conceptual merit for purposes of, for example, identifying jurisdictions that spend a large or small amount compared to what they can afford. The final measure expresses government overhead as a percentage of all the jurisdiction's expenditures. Since overhead expenses involve the costs of administering the activities paid for by the rest of the budget, this measure has merit for purposes of expressing expenditures relative to need for that service.[1] In short, the alternative standardization procedures yield distinct expenditure-level measures expressed relative to the jurisdiction's general size, economic resources, and service needs.

The conceptual distinctness of the alternative expenditure-level measures does not necessarily imply great practical differences. If research obtains essentially identical results using the alternative measures, the choice of measure has little practical importance. Table 1 presents the intercorrelations among the alternative measures in order to examine the empirical differences.

Table 1: *Intercorrelations among Alternative Measures of Expenditures for Government Overhead*

Alternative Measures	Per Capita	Per $1,000 Personal Income	Percent Total Expenditures
Per capita		.85	.41
Per $1,000 personal income	.92		.46
Percent total expenditures	.64	.68	

Note: Numbers below diagonal are correlations. Numbers above diagonal are squared correlations; these indicate the proportion of shared statistical variation.

The correlations in Table 1 show great similarity between the measures standardized by population and by personal income, but great differences between those two measures and the measure standardized by total expenditures. Whereas expenditures per capita and per $1,000 personal income share 85 percent of their statistical variation, those two measures share less than half of their statistical variation with expenditures expressed as a percent of total expenditures. Despite their conceptual distinctness, the per capita and the personal income standardized measures differ little empirically, in sharp contrast to the measure standardized according to the percent of total expenditures.

Although these results show little practical difference between the per capita and the personal income standardizations, other possible groups of jurisdictions might have much weaker relationships between total population and total personal income—as could result, for example, from extreme regional variations in economic well-being. In such cases, the differences between expressing expenditures relative to population or relative to personal income could become important. Given more moderate economic variation as found in this example, however, population and total income correlate so closely that per capita and personal income standardizations offer, in effect, closely related alternative ways of taking into account jurisdictional size.[2]

In contrast to population and personal income, standardizing by total expenditures standardizes not by size of the jurisdiction, but by size of the government, which for government overhead services constitutes a measure of service need.[3] This result suggests that expenditure-level measures standardized by proxies for specific service needs may tend to differ from measures standardized by general size or by economic resources.

1. Note that computing a percent-of-all-city-expenditures measure makes sense only for overhead expenditures, since the rest of the budget serves as a need proxy only for overhead services. For other services appropriate needs proxies specific to those services would be required in order to compute a needs-standardized expenditure measure.

2. Population and total personal income correlate over .99 with each other, but only .92 and .93, respectively, with total city expenditures.

3. As noted in footnote 1, standardizing by total expenditures would not be appropriate for most expenditure categories.

Effect of Alternative Measures on Comparisons of Cities

The choice of expenditure-level measures can have various effects. One effect is apparent when making comparisons among different cities—for example, attempting to identify cities that are big spenders. This study can investigate this effect by comparing the rank order for the 90 California cities on the three different expenditure measures. The rankings for the biggest spending cities remain almost the same whether expenditures per capita or expenditures per $1,000 personal income are used: the top 10 cities on the per capita measure are all within the top 11 on the personal income measure. The rankings for expenditures based on percent of total expenditures, however, differ substantially: the top 10 cities on the per capita measure rank as low as 40 on the percent-of-total-expenditures measure. In short, comparisons of the rankings of cities on the alternative measures confirm the findings from the previous correlation results. Although only small practical differences were found between the per capita and income standardized measures, more dramatic differences resulted when standardizing by a measure of specific service needs.

Examining the rankings for individual cities demonstrates the potential importance of the choice of measure for drawing conclusions about spending levels of specific jurisdictions. Even the population and income standardized measures can differ dramatically. For example, Newport Beach ranks 21 on general government expenditures per capita, but due to its affluence (highest per capita personal income of all cities) it ranks only 75 on expenditures per $1,000 personal income. Oakland ranks 15 on per capita general government expenditures, but because of its high total per capita city expenditures (third highest of all cities) it ranks only 58 on the percent-of-total-expenditures measure. Rancho Cucamonga ranks near the bottom on general government expenditures per capita (83) and per $1,000 personal income (86), but because of its extremely low total per capita city expenditures (lowest of all cities) it ranks 25 on the percent-of-total-expenditures measure. Not all cities differ greatly on the alternative measures: the cities that Bernick (1990, 20-21) used as examples of extravagant (Santa Monica) and frugal (Simi Valley) cities appear at the extremes on all three alternative expenditure-level measures. In short, although for some cities the choice of measure does not make much difference, the choice of an alternatively standardized measure can dramatically alter the perspective on other cities' expenditure levels.

Effect of Alternative Measures on Other Finance Research

Another possible effect of the choice of expenditure-level measures could occur when conducting other types of finance research. For example, a continuing research question about local government finance concerns scale economies—whether efficiency changes with size of government. Especially for expenditures like government overhead one might expect larger jurisdictions to demonstrate greater efficiency. Using per capita expenditure statistics, Bernick (1990, 18) purports to show that government overhead for California cities with more than 50,000 population does not decrease, but indeed increases. This is a good illustration of the potential impact the choice of measure can have on research.

Figure 1 graphically shows the relationship between the size of the government, as measured by the logarithm (base 10) of total expenditures,[4] and per capita government overhead. Besides showing the individual cities, the scatterplot also shows the regression line and the 95 percent confidence bands. The cities that appear as high-expenditure outliers are Santa Monica, cited by Bernick (1990) as an extravagant city, and San Francisco, unique as a combined city-county. Even removing these two outliers, Figure 1 shows a statistically significant positive relationship between government overhead expenses and size of the government.[5] Thus, Figure 1 seems to provide evidence that larger size decreases, rather than increases, efficiency.

Now contrast the findings shown in Figure 2. Figure 2 replaces per capita government overhead with government overhead expressed as the percent of all government expenditures. No evidence appears that expenses go up with size; indeed, overhead expenses ap-

4. Using the logarithm of total expenditures, rather than total expenditures, implies a diminishing marginal effect of each dollar increase in total expenditures. In this example, the logarithmic transformation helps to linearize the relationship.

5. The t-statistic for the regression coefficient is 4.5 ($p < .001$) using all cities, and 2.6 ($p = .012$) without the two outliers.

Figure 1: *Per Capita Government Overhead Compared with Total Expenditures*

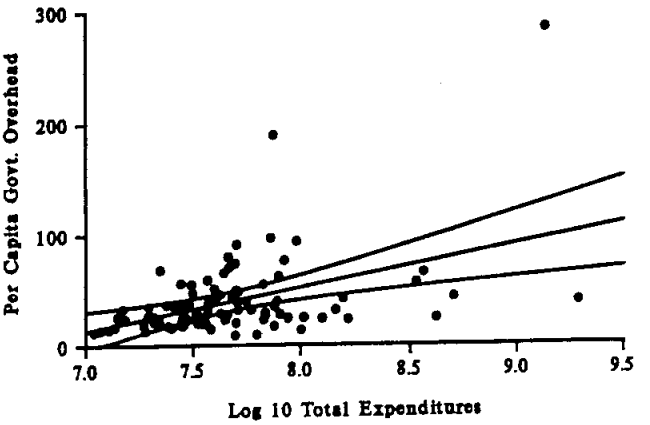
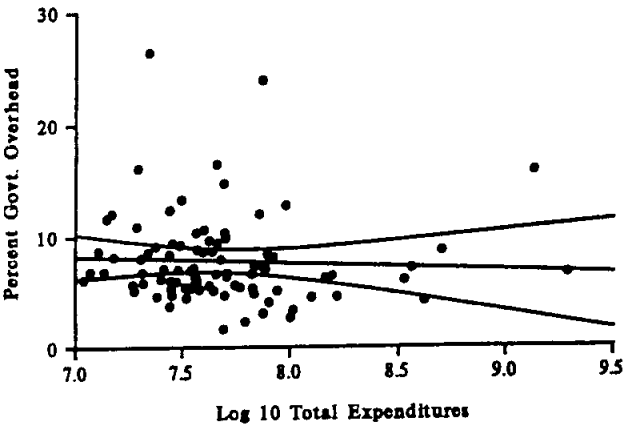


Figure 2: *Percent Government Overhead Compared with Total Expenditures*



pear to decrease slightly.[6] This indicates that larger size not only does not decrease, but perhaps increases, efficiency.

Which finding is correct? Both are correct, but the appropriate one to use depends on the research question. Does the question about scale economies ask "Do cities with larger-size governments have smaller per capita expenditures for government overhead?" without considering need for overhead services, or does the question take need into account by asking "Do cities with larger-size governments have smaller percentage expenditures for government overhead?" The first question, and hence the findings in Figure 1, potentially mislead us because the larger jurisdictions tend to have higher total expenditures per capita, necessitating more government overhead per capita to manage the increased government activity. Standardizing by total government expenditures takes the level of government activity, and hence the need for overhead services, into account.

Conclusion

As the findings from this study illustrate, expenditure-level measures computed using different standardization procedures can yield dramatically different results. Expenditure-level researchers therefore must consider the differences among alternative possible measures in order to choose a measure appropriate for the purpose. By implication, public administrators who find themselves attacked by "bureaucracy bashers" citing expenditure-level statistics should examine the appropriateness of the statistics.

Despite having tradition in their favor, per capita measures do not always fit the research purpose, and can yield misleading results. Alternatives to per capita statistics include measures standardized by economic resources or by service needs. Opportunity abounds for researchers to develop better methods for standardizing. Following up on the fiscal capacity research, for example, expenditure-level researchers might use measures of tax capacity, rather than personal income, to standardize for economic resources. Similarly, researchers could use service-specific measures of service needs, rather than gross population. Through such improvements in standardization methods, combined with improved cross-jurisdictional comparability in accounting practices, expenditure-level researchers can make more meaningful comparisons of expenditure levels.

6. The regression coefficient is negative but not statistically significant ($t=-.6$).

References

Advisory Commission on Intergovernmental Relations (ACIR). 1987. *Measuring state fiscal capacity.* Washington, D.C.: ACIR.

———. 1988. *Significant features of fiscal federalism,* Vol. 2. Washington, D.C.: ACIR.

Beck, Morris. 1985. Public expenditure, relative price, and resource allocation. *Public Finance* 40: 17-34.

Bernick, Michael S. 1990. Fat cities? *Golden State Report* 6 (March): 18-21.

Boggs, Sara L. 1965. Urban crime patterns. *American Sociological Review* 30 (December): 899-908.

California State Controller. 1984. 1985. *Annual Report of Financial Transactions Concerning Cities of California.* Sacramento, Calif.

Cohen, Carol E. 1989. State fiscal capacity and effort: an update. *Intergovernmental Perspective* 15 (Spring): 15-20.

Cohen, Lawrence E., Robert L. Kaufman, and Michael R. Gottfredson. 1985. Risk-based crime statistics: A forecasting comparison for burglary and auto theft. *Journal of Criminal Justice* 13: 445-57.

Deacon, Robert T. 1980. State and local government expenditures. In *Essays in public finance and financial management.* John E. Petersen and Catherine Lavigne Spain, eds. Chatham, N.J.: Chatham House.

Hughes, Jesse W., and Raymond Laverdiere. 1986. Comparative and local government financial analyses. *Public Budgeting and Finance* 6 (Winter): 22-33.

Phillips, Phillip D. 1973. Risk-related crime rates and crime patterns. *Proceedings, Association of American Geographers* 5: 221-24.

Skogan, Wesley G. 1978. *Victimization surveys and criminal justice planning.* Washington, D.C.: Government Printing Office.

Stipak, Brian. 1988. Alternatives to population-based crime rates. *International Journal of Comparative and Applied Criminal Justice* 12 (Winter): 247-60.

Tax Foundation. 1988. *Facts and figures on government finance.* Baltimore: Johns Hopkins University Press.

U.S. Bureau of the Census. 1988. *County and city data book.* Washington, D.C.: Government Printing Office.

———. 1990. *Government finances in 1987-1988.* Washington, D.C.: Government Printing Office.

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