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# Essays in PUBLIC FINANCE and FINANCIAL MANAGEMENT

State and Local Perspectives

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# Revenue and Expenditure Forecasting by State and Local Governments

Roy W. Bahl

The instability of state and local government economies has placed a premium on effective fiscal planning at the state and local levels. In the Northeast and industrial Midwest, the economic base is in decline as jobs continue to shift to the faster-growing South and Western regions, and central cities in this region are doubly damned in that they continue to lose jobs to their surrounding suburbs. In the face of this decline, it is important to evaluate the level of resources available in the near future and to estimate the expenditure implications of likely claims against these revenues, e.g., the effects of public employee union demands.

The need for effective fiscal planning is no less pressing in the growing regions. Suburbanization, industrialization, and pressures to "catch up" in the quality of public services delivered and in the levels of public employee compensation paid all are pushing state and local government budgets upward. Long-term fiscal planning in the growing areas may ameliorate some of the fiscal difficulties which lie ahead. A painful lesson learned from governments in the older region is that expenditure commitments are long-lived and not easily reversible. For example, New York City's debt burden and pension obligations are examples of commitments made at a time when the economy was more able to support a higher level of public sector activity.

This importance notwithstanding, the state of the art in revenue and expenditure forecasting is primitive.<sup>1</sup> While some state governments have sophisticated revenue-forecasting schemes that project for a five-year period,<sup>2</sup> few if any have a similar technique for expenditures. At the local level there are very few attempts to carry out any systematic revenue and expenditure forecasts. A recent survey by the Urban Consortium included 28 cities and six counties with populations of more than 500,000 and received an 82 percent response. While the survey was able to identify the existence of some systematic techniques, 72 percent of the respondents stated that the forecasts were primarily extrapolation, ". . . taking into account recent trends and adjusting these trends based on current information on future trends."<sup>3</sup>

Because the problems associated with forecasting revenues and expenditures—particularly expenditures and particularly at the local government level—are indeed formidable, there has been a paucity of research on the subject. The purpose of this paper is to explore, albeit in a summary fashion, the major problems associated with

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revenue and expenditure forecasting and in that context to review the state of the literature. In the final section we mention the broader question of budgetary forecasting, i.e., a model which simultaneously takes into account the effects of exogenous factors on revenues and expenditures. Before reviewing the problems and prospects for revenue, expenditure, and budgetary forecasting, we consider the alternative approaches which have been taken to project the outlook for state and local governments.

The concern in this review is with forecasting for an intermediate period—approximately five years. The one-year forecast, such as that used to develop the annual budget, is not the issue here since it is not clear that such projections cannot be better done without systematic models.

## **Techniques For Projecting Local Government Fiscal Viability**

A proper forecast of the fiscal viability of a local government would be derived from analysis of both the current situation and that projected for the future, and it would reflect consideration of both the financial and the economic structure of the local area.<sup>4</sup> Most importantly, it would be based on an underlying theoretical model which would enable evaluation of fiscal health with respect to clearly defined criteria. Three general avenues of state-local fiscal evaluation have been followed by various analysts: comparative quantitative analysis, comparative case studies, and aggregate state-local sector analysis.

### *Comparative Quantitative Analysis*

The absence of a normative theory of public output has led economists to concentrate their attention on the more positive question of what determines municipal expenditure, revenue, and debt levels. From this concern has grown a series of studies which attempt to find a statistical relationship between the level of these fiscal-outcome indicators and the social, economic, and demographic characteristics of the community. These “determinants” studies are almost all cross-section, and usually employ a straightforward multiple regression technique.<sup>5</sup>

Though there is much virtue to the determinants approach, it may be critiqued on grounds that it does not permit analysis and projection of the fiscal status of individual local government units. At best, it allows one to determine how a particular local government unit compares to others at a given point in time. Such results do not enable analysis of how the current cash-flow position of a government is likely to be changed by future economic or demographic developments. Moreover, exogenous but important factors such as the national inflation rate are not even considered in a cross-section model, since these are assumed to affect all governments equally. Finally, the determinants model is often estimated at a very aggregated level (e.g., expenditures are usually taken as the single output proxy) so that underlying financial indicators and even factor cost differentials are not usually considered.

For these reasons, plus others relating more purely to measurement and data problems, the determinants approach may be quite readily rejected as a foundation for a model that can identify, through estimation of budgetary outlooks, those jurisdictions that are likely to face a cash-flow crisis.

### *Case Studies*

Case studies of local government fiscal viability have many of the characteristics necessary for projections of budgetary conditions. They may be detailed and take into account the factor important to a specific city, and they may consider both the short-term cash flow and long-term economic factors.<sup>6</sup>

There can be little question but that a kind of case-study approach is necessary to accurately evaluate and project the behavior of the local government fisc. However, a missing ingredient in most case studies which have been carried out is the use of a well-defined and comparable model.

## Sector Projections

A third approach is to project the fiscal position for the entire state-local sector. While there are not a great many fully developed and systematic projection exercises that are routinely carried out for the state-local sector, less ambitious aggregate studies are fairly common. Two of the more important major aggregate studies of recent vintage are those prepared by the Tax Foundation<sup>7</sup> and by the American Enterprise Institute.<sup>8</sup> Though now a bit dated, these studies agreed in two important respects: that the state-local sector will be in surplus by 1980, and that fiscal problems will relate more to specific urban areas with "special" difficulties.

Although one could raise several objections to the assumptions on which these studies are based and to the optimism of their conclusions,<sup>9</sup> the relevant issue in the present context involves whether aggregative sectoral analysis runs the risk of obscuring more than it reveals about the condition of particular jurisdictions. The point is that sectoral analysis focuses exclusively on the *net* budgetary position of the entire sector rather than on the budgetary position of individual governments. Notwithstanding the utility of knowing about the aggregate budgetary position of the entire state and local sector, particularly in connection with questions involving the capital market's ability to accommodate the financial requirements of governmental and private users of capital and other highly aggregative policy issues, such information is of little value in evaluating the fiscal outlook of single jurisdictions or in comparing conditions among several jurisdictions. In other words, the outlook for a particular city is not likely to be enhanced simply because the outlook for the aggregate of cities is bright.<sup>10</sup>

## Revenue Forecasting

Developing a model for revenue forecasting requires dealing with four important problem areas: (1) cleaning the tax revenue series of discretionary changes in the rate and base, (2) identifying a proper independent variable(s), (3) developing an appropriate model for purposes of estimation, and (4) forecasting intergovernmental revenues. Because of one or the other of these problems, fiscal forecasting research has been centered on state government sales and personal income taxes to the neglect of the largest major revenue sources in the state-local sector—the property tax and intergovernmental flows.

### *Cleaning the Tax Series*

The problem of cleaning a revenue yield series of all discretionary changes is a serious impediment to developing a forecasting model, even in the relatively easy sales and income tax cases.<sup>11</sup> Three approaches to cleaning the series have been used. The first was developed by Prest in estimating the elasticity of the personal income tax in the United Kingdom.<sup>12</sup> He roughly estimates *automatic* growth by using information on how much of each year's tax increase is due to legal changes. The method does not adequately adjust for the effects of any given year's discretionary change on revenues generated in all future (or past) years; hence it is too rough for use on state and local government tax forecasting.

An alternative approach, a so-called constant structure method, would simulate the tax yield in all past years if under the current structure.<sup>13</sup> Though based on the simplifying assumption that past tax structure changes have not affected the aggregate level of income, this approach has been widely used.<sup>14</sup> The third approach cleans the series while estimating the elasticity coefficient by introducing a dummy variable for years in which major discretionary changes have taken place.<sup>15</sup> The difficulty with this approach is that discretionary changes in rate and base occur much too frequently and the dummy variable may only be used for major discretionary changes.

The problem of cleaning the series is even more complicated in the case of the property tax, since it is not clear what constitutes a discretionary change. Certainly

changes in the statutory tax rate are discretionary, but less clear are the cases of improvements in assessment practices and changes in the equalization rate.

### *Choosing the Independent Variable*

To develop a forecast, tax revenue and tax base growth must be related to the growth in some variable which reflects local economic growth. The common choice for an independent variable is personal income in the community (so common is the choice that the income elasticity of tax revenues is referred to in shorthand manner as *the* elasticity of tax revenues). Despite this common practice, there are serious flaws with personal income as the independent or predictor variable. First, available measures of personal income are subject to major omissions, hence may not accurately reflect fiscal capacity. Second, data on personal income are generally two years out of date, and forecast income data are not readily available. Finally, the personal income independent variable is subject to the criticism that it is not available on a small area basis, i.e., city or county.

For these reasons, some have suggested that a better indicator of local economic activity might be the aggregate level of private employment.<sup>16</sup> There are a number of reasons for choosing the employment base rather than the income base as a gauge of the level of economic activity. First, employment data are collected and reported on an industry basis and in a form that is more consistent, comprehensive, and detailed than that for income data. Second, the principally used measure in virtually all the analyses of core-city decline is employment loss. Third, employment is the measure most commonly applied in the analysis of urban structure and urban economic base changes.<sup>17</sup> Finally, labor and capital are the primary mobile inputs in the productive process in urban areas, and of the two, at least measurement ease would dictate the choice of the employment unit.<sup>18</sup>

### *Defining the Model*

A third major problem in developing revenue forecasting techniques is the defining of an appropriate model. The traditional model estimates tax revenue growth as a function of growth in some indicator of local or state economic activity. This approach does not allow for a feedback effect, e.g., for the effects of taxes on the level of personal income. It may, however, express taxes as a function of a number of independent variables, usually in a single-equation model.<sup>19</sup> A variant on this approach is Auten and Robb's work on Missouri, where the model explicitly allows for the interaction of various taxes but not for the feedback effects.<sup>20</sup>

The alternative is to specify a simultaneous-equation model which does allow for the feedback effects. Simultaneous-equation models have several advantages as a forecasting methodology. The flexibility provided by a multiple-equation system can allow for greater realism in modeling revenue functions, and such models are easily adaptable for simulation by changing the exogenous variables within the several equations over a range of values.<sup>21</sup> However, the advantages of simultaneous models do not come without additional costs. Data requirements are in most instances massive and a substantial investment must be made to build, estimate, and update the model. As a result, there are few examples of the use of this technique at the local government level. Oddly, the larger models tend not to treat the public sector in as great a detail as does the traditional model. Much less attention is paid to particulars of the tax structure, and large models seem to have less ability to capture the revenue effects of changes either in the underlying economic base or in the structure of the tax itself.

### *Projecting Intergovernmental Flows*

The fourth problem with revenue forecasting is developing a proper treatment of intergovernmental flows. These obviously require a different approach since they cannot be extrapolated or linked to a specific local variable such as personal income.

Direct federal or mandated federal pass-through funds might be projected from

formulae and estimated appropriation size; at least some degree of certainty can be placed on the estimates. State aid flows are more difficult to estimate since they are more variable, depending on the fiscal position of the state government. In states where such transfers are important, one is led to the inescapable conclusion that a local government revenue forecast requires a state government revenue forecast.

### **Expenditure Forecasting**

The expenditure forecasting problem is qualitatively different than the revenue forecasting problem. In the tax revenue case, the issue is one of projecting the natural growth in the tax bases to determine how much revenue will be generated at a given rate structure. In the expenditure case, the forecast requires assumptions about desired levels of services, the productivity of workers, the cost of labor and materials, the level of employment, capital improvements, and the level of fringe benefits. By comparison with the revenue side, there would seem considerably more room for discretion on the part of the local government. For that reason, the expenditure forecasting problem is considerably more difficult than the revenue forecasting problem.

There is little by way of a literature arguing a systematic, analytic approach to expenditure forecasting.<sup>22</sup> However, there are related analyses of expenditure determinants,<sup>23</sup> the demand for state and local government employment,<sup>24</sup> and the determinants of municipal wage rates<sup>25</sup> which are useful in enumerating the factors that underlie expenditure growth. The most reasonable of the systematic projections of long-term expenditure growth take these determinants as a starting point and simulate alternative expenditure outcomes.

When this approach is taken, an early issue which arises is the need to separate the "controllables" from the "noncontrollables." While this has stirred some debate, for projection purposes there has been general agreement on the following list of short-term noncontrollables: service and repayment of existing debt,<sup>26</sup> pension obligations, mandated transfer payments, negotiated wage and fringe increments, and the increased price of essential government purchases. These items may be directly built into the projections.

Other expenditure items are more controllable, though some (e.g., certain police services) are so essential that they become noncontrollables. Still it is possible to adjust the larger components of expenditures, particularly labor costs, for different levels of wage rate, benefit, and employment increase.

A second major problem is how to treat inflation. There are no good indexes of prices paid by local governments for labor and nonlabor services, and the development of such indexes is a laborious task.<sup>27</sup> Yet some portion of local government cost increase is surely due to price increases and has to be captured in the projections.

A third difficulty is projecting the variables that drive the simulation. These usually include community income, negotiated wage rates in the private sector, school enrollment rates, the regional inflation rate, etc. Clearly, this type of data is most difficult to forecast and to relate in a systematic way to expenditure increase.

### **Budgetary Forecasting**

Revenue and expenditure forecasts may be combined to project a range of possibilities for the overall fiscal deficit/surplus facing a state or local government. By combining the most likely sets of assumptions, the most likely budget position could be forecast. Viewed another way, from a range of outcomes it should be possible to determine the conditions under which substantial budget deficits will occur and the nature of the relationship between the state and local government budgetary positions.

There are two techniques open for budgetary forecasting. The first is to determine expenditures and revenues simultaneously in the context of a full econometric model.<sup>28</sup> The second is to combine separate revenue and expenditure analyses in a



consistent manner and simulate alternative outcomes. Given the state of the art and the great generality of full econometric models in forecasting the state and local government budget, this piecemeal approach would seem the most appropriate next step.

### Notes

1. No distinction is made here between forecasting and projecting. Either term is taken to refer to a best estimate of the fiscal outcome under alternative assumptions about the growth in factors affecting that outcome.
2. For a review of alternative techniques used, see R. Berney and B. Fredrichs, "Income Elasticities for State Tax Revenues; Techniques of Estimation and Their Usefulness for Forecasting," *Public Finance Quarterly* (October 1973), pp. 409–425.
3. The Urban Consortium, "A Process for Revenue and Expenditure Forecasting in Local Government," mimeographed (Washington, D.C.: The Urban Consortium, 1977).
4. In this section, I draw from Roy Bahl and Bernard Jump, "Projecting the Fiscal Viability of Cities," in *Fiscal Choices of State and Local Governments*, ed. George Peterson (Washington, D.C.: Urban Institute, 1978).
5. Reviews of the determinants literature may be found in Roy Bahl, "The Determinants of Public Expenditures: A Review," in *Functional Federalism: Grants-in-Aid and PPB Systems*, ed. Selma Mushkin and John Cotton (Washington, D.C.: George Washington University, State-Local Finance Project, 1968); George Wilensky, "Determinants of Local Government Expenditures," in *Financing the Metropolis: Public Policy in Urban Economics*, ed. John Crecine (Beverly Hills, California: Sage, 1970); John E. Fredland, "Determinants of State and Local Expenditures: An Annotated Bibliography" (Washington, D.C.: Urban Institute, 1974).  
Recent studies include Thomas E. Borcharding and Robert T. Deacon, "The Demand for the Services of Non-Federal Governments," *American Economic Review* 62 (December 1972), pp. 891–901; and T. C. Bergstrom and R. P. Goodman, "Private Demands for Public Goods," *American Economic Review* 63 (June 1973), pp. 280–296.
6. See Advisory Commission on Intergovernmental Relations, *City Financial Emergencies: The Intergovernmental Dimension* (Washington, D.C.: U.S. Government Printing Office, 1973); and David Stanley, *Cities in Trouble* (Columbus, Ohio: Academy for Contemporary Problems, 1976).
7. Tax Foundation, *The Financial Outlook for State and Local Government to 1980* (New York: Tax Foundation, 1972).
8. David J. Ott, Attiat F. Ott, James A. Maxwell, and J. Richard Aronson, eds., *State-Local Finances in the Last Half of the 1970s* (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1975).
9. Some of these objections are set forth in Roy W. Bahl, Bernard Jump, and David Puryear, "The Outlook for State and Local Government Fiscal Performance," in *The Future of State and Local Government Finances, Hearings before the Subcommittee on Urban Problems of the Joint Economic Committee*, 94th Congress, 2nd sess., 1976
10. Alternatively, the sectoral projection model could be useful if it were built up from estimates of the budgetary position of individual state and local government units. Such an undertaking would be massive and to the author's knowledge has not been carried out.
11. The various approaches to cleaning a tax revenue series are outlined in Roy W. Bahl, "Revenue Forecasting in Less Developed Countries," mimeographed (Washington: D.C.: International Monetary Fund, 1971).
12. Alan Prest, "The Sensitivity of the Yield of the Personal Income Tax in the United Kingdom," *The Economic Journal* 76 (September 1962), pp. 576–596.
13. Robert Harris, *Income and Sales Taxes: The 1970 Outlook for States and Localities* (Washington, D.C.: Council of State Governments, 1966).

14. See, for example, Michael Wasylenko, "Estimating the Elasticity of State Personal Income Taxes," *National Tax Journal* 28 (March 1975), pp. 139-42.
15. John B. Legler and Perry Shapiro, "The Responsiveness of State Tax Revenue to Economic Growth," *National Tax Journal* 21 (March 1968), pp. 46-56; and Neil Singer, "The Use of Dummy Variables in Estimating the Income-Elasticity of State Income Tax Revenues," *National Tax Journal* 21 (March 1968), pp. 200-204.
16. Roy Bahl and David Greytak, "The Response of City Government Revenues to Changes in Employment Structure," *Land Economics* 52 (November 1976), pp. 415-434.
17. See Edgar Hoover and Raymond Vernon, *Anatomy of the Metropolis* (Cambridge, Massachusetts: Harvard University Press, 1959); and David Birch, *The Economic Future of Cities and Suburbs*, CED Supplementary Paper Number 30 (New York: New York Committee for Economic Development, 1970).
18. Charles Tiebout, *The Community Economic Base Study*, CED Supplementary Paper Number 16 (New York: New York Committee for Economic Development, 1962).
19. See, for example, Lee Madere, "Municipal Budget Projections: New Orleans, La.," mimeographed, U.S. Department of Housing and Urban Development, Washington, D.C., forthcoming.
20. Gerald E. Auten and Edward H. Robb, "A General Model for State Tax Revenue Analysis," *National Tax Journal* 29 (December 1976), pp. 422-435.
21. Robert H. Milbourne, "Econometric Forecasting in Wisconsin: Personal Income Tax Collections," *Presentations on Revenue Estimating Procedures* (Chicago: Federation of Tax Administrators, 1976).
22. Roy Bahl and Richard Gustely, "Forecasting Urban Government Expenditures," *Proceedings of the Sixty-Seventh Annual Conference of the National Tax Association* (Columbus, Ohio: National Tax Association, 1974); and Claudia Scott, *Forecasting Urban Government Expenditures* (Lexington, Massachusetts: Lexington Books, 1971).
23. Roy Bahl, "The Determinants of Public Expenditures;" John E. Fredland, "Determinants of State and Local Expenditures;" and Jesse Burkhead and Jerry Miner, *Public Expenditure* (Chicago: Aldine Publishing Company, 1971).
24. Ronald Ehrenberg, "The Demand for State and Local Government Employees," *American Economic Review* 63 (June 1973), pp. 366-379; and Orley Ashenfelter, "Demand and Supply Functions for State and Local Employment: Implications for Public Employment Programs," mimeographed (Princeton, New Jersey: Princeton University, 1972).
25. R. Baird and John Landon, "The Effects of Collective Bargaining on Public School Teachers' Salaries: Comment," *Industrial Labor Review* 24 (April 1972), pp. 410-417; and James C. Ohls and T. J. Wales, "Supply and Demand for State and Local Services," *Review of Economics and Statistics* 54 (November 1972), pp. 424-430.
26. However, as is so vividly illustrated by the New York case, even debt-repayment schedules can be altered in the long run. The concept of a controllable versus a noncontrollable expenditure, therefore, must be handled very carefully.
27. David Greytak and Bernard Jump, Jr., *The Impact of Inflation on the Expenditures and Revenues of Six Local Governments, 1971-1979*, Metropolitan Studies Program, The Maxwell School, Syracuse University (Syracuse, N.Y.: Syracuse University, 1975); and David Greytak, Richard Gustely and Robert Dinkelmeyer, "The Effects of Inflation on Local Government Expenditures," *National Tax Journal* 27 (December 1974), pp. 583-598.
28. J. C. Hambor, M. R. Norman, and R. R. Russell, "A Tax Revenue Forecasting Model for the State of Hawaii," *Public Finance Quarterly* 2 (October 1974), pp. 432-50.