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## Forecasting Urban Government Expenditures

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FORECASTING URBAN GOVERNMENT EXPENDITURES

Author(s): Roy W. Bahl and Richard Gustely

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CHAIRMAN COOK: Thank you very much gentlemen. Our next speaker is Richard Gustely who will present results of a study on Forecasting Urban Government Expenditures which he and Roy Bahl did.

## FORECASTING URBAN GOVERNMENT EXPENDITURES \*

ROY W. BAHL

Professor of Economics and Director  
Metropolitan Studies Program  
The Maxwell School of Citizenship and Public Affairs  
Syracuse University  
Syracuse, New York

AND

RICHARD GUSTELY

Assistant Professor  
School of Architecture  
Division of Environmental and Urban Systems  
Virginia Polytechnic Institute and State University  
Blacksburg, Virginia

While the need for planning urban government expenditures is clearly recognized, surprisingly little has been done by way of developing usable expenditure projection models.<sup>1</sup> The development of revenue forecasting models on the other hand, has received considerable attention and several useful models exist. A number of reasons might be offered for this greater amount of attention to the revenue side, e.g., revenue bases can be measured while expenditure outputs cannot, the determinants of tax revenue growth are more identifiable than the determinants of expenditure growth, tax revenue forecasting requires detailed study of a relatively few major taxes while expenditure forecasting requires consideration of a large number of expenditure categories. Whatever the reasons, research on long term, or intermediate term, expenditure estimation has been infrequent. The objective of this paper is to take a first step toward filling this gap in the fiscal planning area by describing a relatively simple urban government expenditure forecasting model and demonstrating its use in the context of a case study of New York City.

\* This research is supported by a grant from the Ford Foundation to the Metropolitan Studies Program of the Maxwell School for research on urban public employment problems.

<sup>1</sup> For one notable exception, see Claudia Devita Scott, *Forecasting Local Government Spending*, The Urban Institute, (Washington, D.C., 1972).

## EXISTING APPROACHES

Fiscal planners at the State-Local government level typically use a naive<sup>2</sup> approach in projecting expenditures, for example, as in the preparation of annual budget estimates. In fact, for purposes such as the preparation of next year's budget, a judgmental approach usually produces accurate results. However, naive type forecasts based on expert judgement are less satisfactory when intermediate or longer term forecasts must be made. There simply are too many variables and interactions to be taken into account. Nevertheless, state or local tax studies must begin with some estimate of the range of future levels of spending. This estimate is based on a set of general assumptions about how much expenditures will increase because of inflation, scope of services, population size, and a number of other factors usually chosen on a basis of a priori reasoning. This approach is weak and amounts to little more than an informed guess. The number of expenditure-affecting factors included — inflation, scope of service, population — is arbitrary and, in any case, they overlap and double counting results. Moreover, the percentage increases assumed are arbitrary, and possibly not based even on trend. In short, the naive approach is not a satisfactory method of long term expenditure planning.

A slightly less informal expenditure forecast, found in some fiscal planning studies, is a simple extrapolation of past trends. This may be carried out for total expenditures or by function, but in any case is based on an assumption that past trends will continue during the forecast period. This assumption, that inflation rates, population growth, public employee productivity growth, union bargaining success and all other relevant factors will continue to grow at the same rate and effect expenditures in the same way, does not square with observed historical trends.

A more formal approach to studying the factors which cause expenditures to be higher or lower has come to be known as the "determinants" literature.<sup>3</sup> While these studies are intended primarily to explain differences in spending levels between governmental units at a point in time, it has been suggested that they may also be used to predict the expenditure response to changes in the explanatory factors. The view here is that this approach is not useful in forecasting local

<sup>2</sup> We use the term naive to refer to forecasts from non-formal models, e.g., judgmental forecasts.

<sup>3</sup> For a review of these studies, see Roy Bahl, "Studies on the Determinants of Public Expenditures: A Review," in *Functional Federalism*, ed. by S. Mushkin and J. Cotton, George Washington University (Washington, D.C., 1968); and Gail Wilensky, "Determinants of Local Government Spending," *Financing the Metropolis*, ed. by J. Crecine, Sage Publications, (Beverly Hills, 1970).

government expenditures. Three reasons might be offered: First, temporal inferences may not be made legitimately from cross-section analyses. For example, because intercity differences in fire expenditures are significantly related to intercity differences in population density, it does not necessarily follow that for any one city an increase in density will result in an increase in fire expenditures. The second problem with this approach is one of measurement. Most of the explanatory variables in such models are taken from the *Census of Population* and, hence, are available only once every ten years. Forecasting expenditures from a determinants model, then, would require independent projections of the explanatory factors, a formidable task in itself. This problem of data availability is the primary reason why there has been so little time series research on the determinants of public expenditures. The third problem with using determinants studies for forecasting is probably the most severe — the determinants model doesn't truly reflect the process by which state and local government expenditures change. In fact, expenditures change because public sector wage rates, benefit levels, numbers of employees, material costs, etc., change. It would seem a reasonable thesis that the explanation of temporal changes in these input costs lies as much in the areas of inflation, private sector wage levels, and union strength than in the socio-economic-demographic characteristics of the city.<sup>4</sup>

In any case, none of the traditional approaches to expenditure level determination seems appropriate for urban government expenditure forecasting, hence we turn attention to an alternative model.

#### THE MODEL

The model presented here is based on a public employment approach to forecasting urban government expenditures.<sup>5</sup> Specifically, the expenditure forecast is based on forecasted values of input levels and their costs, on the assumption that local government officials can better predict these than, for example, the socio-economic characteristics of the community. Moreover, this model is flexible and may be easily altered to forecast expenditures under varying assumptions about input costs. Viewed another way, the model is flexible in that it may be altered to reflect the sensitivity of future expenditures to different discretionary

<sup>4</sup> Such a thesis formed the basis of the model employed in Gustely, *Municipal Public Employment and Public Expenditure*, Lexington Books, (Lexington, Mass.: 1974).

<sup>5</sup> A similar model was proposed and implemented by Scott *Op. Cit.*, in her study of New Haven, and by Bahl, *et. al.*, in a study of Binghamton. See Roy Bahl, Virginia Gerhardt, Sheldon Mann, and Walter Vogt, "A Framework For Fiscal Planning: Binghamton. New York," The Metropolitan and Regional Research Center, Maxwell School of Syracuse University (Syracuse, 1972).

actions, for example, different wage rate increases, pension benefit packages, etc.

Because of their diverse composition, total expenditure forecasts can best be obtained by analysis of individual components. Accordingly, disaggregating total expenditures by object (L, S, R, T), it follows that:

$$X_{ti} = L_{ti} S_{ti} + R_{ti} + T_{ti} \quad [1]$$

where:

$X_{ti}$  = total current expenditures in period t on function i

L = direct labor (payroll) costs

S = material and supplies costs

R = retirement costs

T = transfer payments

and the change in expenditures ( $\Delta X$ ) is

$$\Delta X = \Delta L + \Delta S + \Delta R + \Delta T \quad [2]$$

The operational objective of this model is to forecast the growth in each of these components of expenditure ( $\Delta L$ ,  $\Delta S$ ,  $\Delta R$ ,  $\Delta T$ ) for each function.

Focusing first on direct labor costs (L), let

$$L_t = E_t W'_t I_t \quad [3]$$

where:

$E_t$  = employment level in period t

W = average wage level

W' = average real wage level

I = index of prices (or cost-of-living)

The derivation of an expression of the form

$$\Delta L = \lambda_1 \Delta E + \lambda_2 \Delta I + \lambda_3 \Delta W' \quad [4]$$

will allow the prediction of changes in labor costs ( $\Delta L$ ) on the basis of changes in employment levels ( $\Delta E$ ), inflation rates ( $\Delta I$ ) and real wages ( $\Delta W'$ ). The problem, then, is estimating the coefficients  $\lambda_1$ ,  $\lambda_2$ ,  $\lambda_3$ .

Assuming we want to predict the growth in labor costs between period one and period two ( $L_2 - L_1$ ) it follows that:<sup>6</sup>

<sup>6</sup> The weights employed here for the employment, real wage and inflation terms are not the only ones possible. Others that might be used are

$$\begin{aligned} \Delta L &= W_1 I_1 \Delta E + E_2 I_1 W' + E_2 W'_2 \Delta I \\ \Delta L &= E_1 I_1 \Delta W' + W'_2 I_1 \Delta E + E_2 W'_2 \Delta I \\ \Delta L &= E_1 I_1 \Delta W' + W'_2 E_1 \Delta I + W'_2 I_2 \Delta E \\ \Delta L &= E_1 W'_1 \Delta I + I_2 W'_1 \Delta E + I_2 E_2 \Delta W' \\ \Delta L &= E_1 W'_1 \Delta I + I_2 E_1 \Delta W' + I_2 W'_2 \Delta E \end{aligned}$$

$$\Delta L = W'_1 I_1 \Delta E + E_2 W'_1 \Delta I + E_2 I_2 \Delta W' \quad [5]$$

In other words, the total change in labor costs can be divided into amounts due to employment changes ( $W'_1 I_2 \Delta E$ ), real wage changes ( $E_2 I_2 \Delta W'$ ) and general price level changes ( $E_2 W'_1 \Delta I$ ). Forecasts of future labor costs can therefore be obtained on the basis of projections of employment level changes, real wage changes and general price level changes.

Similarly, for retirement costs ( $R_t$ ), let:

$$R_t = E_t C_t W_t I_t \quad [6]$$

where:

$C_t$  = government pension contribution ratio in year  $t$

The goal here is to derive an expression of the form

$$\Delta R = \gamma_1 \Delta E + \gamma_2 \Delta C + \gamma_3 \Delta I + \gamma_4 \Delta W' \quad [7]$$

which makes it possible to forecast changes in retirement costs from changes in employment, contribution rate, inflation and real wages.

The derivation of the coefficients  $\gamma_1, \gamma_2, \gamma_3, \gamma_4$  follows directly from the disaggregation of growth in retirement costs as follows:

$$\Delta R = C_1 W'_1 I_1 \Delta E + E_2 W'_1 I_1 \Delta C + E_2 C_2 W'_1 \Delta I' + E_2 C_2 I_2 \Delta W' \quad [8]$$

As with labor costs, then retirement cost growth is divided into amounts due to employment change ( $C_1 W_1 I_1 \Delta E$ ), contribution rate change ( $E_2 W'_1 I_1 \Delta C$ ), real wage change ( $E_2 C_2 I_2 \Delta W'$ ), and changes in the inflation rate ( $E_2 C_2 W'_1 \Delta I$ ). Forecasts of growth in total pension or retirement costs, then, can be derived from projections of future wage, employment, contribution rate and inflation rates.

Focusing on material and supplies costs ( $S_t$ ), let:

$$S_t = P_t Q_t = P_t F_t E_t \quad [9]$$

where:

$P$  = average price of materials and supplies

$Q$  = quantity of materials purchased

$F$  = quantity of materials per employee

As above, the purpose here is to derive an expression of the form

$$\Delta S = \delta_1 \Delta P + \delta_2 \Delta F + \delta_3 \Delta E \quad [10]$$

which enables the forecasting of future supply costs on the basis of

(Footnote 6 Continued)

The choice of the allocation formula used above was based on a desire to focus on the effects of employment increases, assuming changes in no other variables. This is possible only when first period weights are associated with the change in the employment variable.

changes in price (P), the proportion in which labor and supply inputs are combined (F), and employment (E).

The coefficients  $\delta_1$ ,  $\delta_2$  and  $\delta_3$  can be estimated from the following expression:

$$\Delta S = P_1 F_1 \Delta E + E_2 P_1 \Delta F + E_2 F_2 \Delta P \quad [11]$$

which, when fixed proportions are assumed ( $F_1 = F_2$ ) becomes

$$\Delta S = P_1 F_1 \Delta E + E_2 F_2 \Delta P \quad [12]$$

Growth in material and supply costs, then, can be allocated into amounts due to employment changes ( $P_1 F_1 \Delta E$ ) and changes in the average price level ( $E_2 F_2 \Delta P$ ). As before, forecasts of material and supply cost can then be obtained from estimates of employment and price level growth.

Finally, transfer payments ( $T_t$ ) can be analyzed in a similar manner. If we let:

$$T_t = T'_t I_t \quad [13]$$

where:

$T'$  = real transfer payments

Then we seek to obtain an expression of the form

$$\Delta T = a_1 \Delta T' + a_2 \Delta I \quad [14]$$

The coefficients  $a_1$  and  $a_2$  can accordingly be obtained directly from the expression

$$\Delta T = I_1 \Delta T' + T_2 \Delta I \quad [15]$$

with the terms indicating amounts of growth in transfer payments due to increases in real expenditure ( $I_1 \Delta T'$ ) and that due to inflation ( $T_2 \Delta I$ ), and allowing forecasts to be made.

The complete model which makes possible forecasts of total expenditures (by function or object, or in the aggregate) follows directly from the forecasting equations derived above. Recalling that

$$X = L + S + R + T \quad [2]$$

the aim here is to derive an expression of the form

$$\Delta X = \beta_1 \Delta E + \beta_2 \Delta W' + \beta_3 \Delta I + \beta_4 \Delta P + \beta_5 \Delta C + \beta_6 \Delta T' \quad [16]$$

which relates changes in expenditures to changes in employment, real wages, inflation, supply prices, contributions rate and real transfer payments.

The coefficients  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$ ,  $\beta_5$  and  $\beta_6$  follow directly from substituting equations (5), (8), (11) and (15) into equation (2). Such an operation yields

$$\begin{aligned}
\Delta X = & (W_1 I_1 + P_1 F_1 + C_1 W'_1 I_1) \Delta E + \\
& (E_2 I_2 + E_2 C_2 I_2) \Delta W' + \\
& (E_2 W'_1 + E_2 W'_1 C_2 + T'_2) \Delta I + \\
& (E_2 F_2) \Delta P + \\
& (E_2 W'_1 I_1) \Delta C + \\
& (I_1) \Delta T'
\end{aligned}
\tag{17}$$

This expression divides growth in total expenditures into amounts relating to changes in employment  $[(W_1 I_1 + P_1 F_1 + C_1 W'_1 I) \Delta E]$ , real wages  $[(E_2 W_1 + E_2 C_2 I_2) \Delta W']$ , inflation  $[(E_2 W'_1 + E_2 W'_1 C_2 + T'_2) \Delta I]$ , the price of materials and supplies  $[(E_2 F_2) \Delta P]$ , the pension contribution rate  $[(E_2 W'_1 I) \Delta C]$ , and real transfer payments  $[(I_1) \Delta T']$ . Forecasts of total expenditures, therefore, are easily obtainable once estimates of changes in each of the key variables are derived.

The strengths of this model are threefold. First, the data necessary for forecasting are easily obtained from budget documents published in most cities. Second, forecasts can be easily computed requiring no sophisticated statistical techniques for their estimation. Finally, the model allows forecasts of either aggregate expenditures or expenditure components (by function or object) with equal ease.

Perhaps even more important, the model permits city government officials to forecast the long term fiscal implications of certain discretionary policy decisions. For example, the differential long term budgetary implications of raising the pension contribution rate by X percent vs. raising the wage rate by Y dollars per hour, could be studied. Such information would seem invaluable for the collective bargaining process.

#### APPLICATION OF THE MODEL

The forecasting model presented above was applied in a case study of the public finances of New York City.<sup>7</sup> The usefulness of the model is demonstrated here first to describe the historical pattern of New York City government expenditures, and then to project spending levels to 1979. In this section, which deals in turn with the historical analysis and the forecast, the police function is used to illustrate the analysis.

<sup>7</sup> See Roy Bahl, Alan Campbell, and David Greytak, *Taxes, Expenses and the Economic Base: A Case Study of New York City*, (Praeger: forthcoming); and Richard D. Gustely, *The Components of Changes in New York City Government Labor Costs — 1965-1972: Police, Fire and Environmental Protection*, Working Paper No. 4 and *The Components of Change in New York City Government Labor Costs — 1965-1972: Social Services, Health Services, Public Schools, Higher Education*, Working Paper No. 6, Maxwell Research Project on Public Finances of New York City, The Maxwell School of Syracuse University (Syracuse, 1972).

## HISTORICAL ANALYSIS, 1965-1972

The historical trend of expenditure increase for the Police Department may be analyzed with the model described above by relating direct labor expenditures, retirement cost expenditures, and non-labor expenditures to changes in employment, real wages, prices, and the pension contribution rate.

In order to determine if there are differences in labor cost trends for different job categories, Police Department labor costs are broken down into five relatively homogeneous classifications: executive, uniformed, clerical, laborer, and other. The executive category includes top level management, to the exclusion of lower level administrative personnel. Uniformed personnel are policemen. The clerical category refers to occupations such as stenographers, clerks and typists. The laborer category is made up of general maintenance as well as skilled personnel. The "other" category includes everything else, e.g., attorneys, accountants, photographers, assistant administrators.

Wages paid to (authorized for) each employee in the Department were aggregated by job category and this total was divided by the number of employees in that job category in order to calculate an average wage rate. This procedure was followed for both 1965 and 1972, and percentage changes in average wage rates and employment levels were calculated.

Between 1965 and 1972, direct labor costs of the Police Department more than doubled, with 94 percent of the increase being directly attributed to uniformed personnel cost increases. These data serve to emphasize the overwhelming importance of uniformed personnel in the Police Department labor cost structure — over 95 percent of total direct labor costs. Still, the *relative growth* in labor costs is greater for the non-uniformed Police Department personnel.

Over the 1965-1972 period, police department employment increased by only 23.6 percent, or by 6,622. When compared to the 100 percent increase in direct labor costs, these statistics would seem to suggest that much of the reason for increasing police expenditures in New York City is to be found in the area of rising wage rates. Before turning to that issue, it is useful to note that, of the total departmental employee increase of 6,622, approximately 78 percent was uniformed personnel. Of the remaining 22 percent, the bulk of the increase was in the "laborer" and "other" categories. With respect to average annual wages, for the department in total, the increase has exceeded 60 percent — the departmental average rising from \$8,554 to \$13,979. In percentage terms, the largest raises are to be found in the administrative and uniformed personnel categories.

In sum, direct labor cost increases for the Police Department over the 1965-1972 period may be characterized by: (1) a cost and em-

ployment structure dominance of uniformed personnel; (2) no noticeable change in this dominance, though the employment of non-uniformed personnel did increase more rapidly than the employment of uniformed personnel; (3) relatively greater increases in average wages than in total employment; and (4) a markedly greater increase in average wages for the uniformed personnel than for all lower paid occupation classes.

Having described the level and composition of increases in total direct labor costs, it remains to estimate the marginal effects on direct labor costs if increases in employment ( $\Delta E$ ), real wages ( $\Delta W'$ ), and inflation ( $\Delta P$ ). The result of applying the model developed above is:

$$L = \$8,554\Delta E + \$296,695,490\Delta P + \$49,010\Delta W' \quad [18]$$

Subject to the assumptions outlined above, direct labor costs rose by \$8,554 for each new employee hired over the period, by \$296,695,490 for each 100 percent increase in the price level (or \$2.96 million per 1 percent rise), and by \$49,010 for a one dollar increase in average real wages.

Substituting observed value for  $\Delta E$ ,  $\Delta P$ ,  $\Delta W'$  and  $\Delta L$  into equation [18], it may be concluded that, of each dollar increase in direct labor costs over the 1965-1972 period, 23.1 cents was due to increases in employment, 51.3 cents, to inflation and 25.6 cents, to increases in real wages.

With respect to retirement system costs, these data show the increase in system membership to parallel almost exactly the total employment increase in the Police Department, and the increase in average salary rates of members to be about four times greater than the rate of increase in members. The contribution rates by employers and employees suggest that the system is moving closer and closer to being non-contributory, i.e., whereas the city government accounted for about 62 percent of total employer plus employee contributions in 1961, the percentage had risen to 80 by 1971. This trend is amplified by the evidence on employer contributions per member, and employer contributions as a percentage of salaries. The city government contribution to the Police Department pension rose from 15.7 percent of salaries in 1961 to 21.6 percent in 1971.

In sum, these data show that city government contributions to the Police Pension Fund have increased substantially in the last decade. For purposes of comparison, it should be noted that the \$33.6 million increase in city government contribution to the Police Pension Fund is equivalent to about 20 percent of the direct labor cost increase which took place over the 1965-1971 period. It is further clear from these data that this increase is partly attributable to each of the factors considered here, i.e., employment increase, real wage rates, inflation, and

changes in the employer contribution rates.

$$\Delta R = \$1,809\Delta E + \$64,785,484\Delta P + 10,172\Delta W' + \$295,824,127\Delta C \quad [19]$$

These results indicate that the hiring of an additional Police Department employee (i.e.,  $\Delta E = 1$ ) increases retirement costs by \$1,809; an increase in average real wages of one dollar ( $\Delta W' = 1$ ) increases retirement costs by \$10,172; a 100 percent change in the price level ( $\Delta P = 100$ ) increases costs by \$64,785,484; and a 100 percentage point increase in the contribution rate ( $\Delta C$ ) will increase costs by \$295,824,127. By substituting values for the independent variables into equation [19] above, it may be shown that changes in the contribution rate have been responsible for 12.8 percent of the increase in retirement costs to the city; employment increases accounted for 32.1 percent; and price increases for 65.6 percent of the increase in retirement costs. It also appears that the decrease in average real wages of members of the police retirement system that occurred over the period 1965-1971 had a dampening effect on retirement costs equivalent to 10.5 percent of the total increase in retirement costs to the city. In other words, had the wages of members of the retirement system kept pace with the cost of living, total retirement costs would have been still higher than they actually were in 1971.

Non-labor costs which are defined here to include expenditures for city government purchases of materials, equipment, supplies, and contractual services, are relatively small by comparison with other objects of police expenditures — 0.3 percent of direct labor costs and 12.7 percent of retirement costs in 1972. The largest components of this increase are in the "supplies" and "contractual services" categories.

The change in non-labor expenditures might be partitioned into:

$$\Delta N = \Delta Q + \$10,138,384\Delta P', \quad [20]$$

which implies that the purchase of one more dollar of supplies (in real terms) ( $\Delta Q$ ) will increase non-labor costs by one dollar, and that an increase in the prices of supplies and materials ( $\Delta P'$ ) of 100 percent will raise non-labor costs by \$10,138,384. By substituting observed values for  $\Delta P'$  and  $\Delta Q$ , 27.8 percent of the increase in non-labor expenditures over the 1965-1972 period is found to be attributable to inflation, and 72.2 percent to an increase in real purchases.

As noted above, by assuming a relationship between the quantity of supplies purchased ( $Q$ ) and the employment level ( $E$ ), it is possible to show the relationship between non-labor costs and employment levels. Accordingly, equation [20] may be rewritten as:

$$\Delta N = \$716\Delta E + \$10,138,384\Delta P'. \quad [21]$$

The objective here is to combine the three analyses presented above

to estimate the sources of increase in total Police Department expenditures over the 1965-1972 period. In order to use the above analysis to this end, a number of assumptions are made. First, since the goal is to estimate actual expenditure changes, it must be assumed that the estimates developed above from budget data may be properly applied to actual expenditures as presented in the comptroller's *Annual Reports*. Second, about 15 percent of Police Department expenditures were not included in the above analysis. It is assumed that, had these expenditures been included, the results would not have been affected. Finally, a somewhat arbitrary classification of all current expenditures into direct labor, non-labor, and retirement costs must be assumed.

Combining these analyses of various components of police expenditures, we obtain:

$$\begin{aligned} \Delta X = & \$9,270\Delta E + \$1,809\Delta E_R + \$361,480,974\Delta P + \$10,138,384\Delta P' \\ & + 49,010\Delta W' + 10,172\Delta W'_R + \$295,824,127\Delta C \end{aligned} \quad [22]$$

where:

- $\Delta E$  = change in employment for whole department
- $\Delta E_R$  = change in retirement system membership
- $\Delta W'$  = change in real wage for whole department
- $\Delta W'_R$  = change in real wage for retirement system membership
- $\Delta P$  = change in price level for consumers
- $\Delta P'$  = change in price level for non-labor costs.

As before, these results can be interpreted to indicate that a change of one unit in departmental employment will raise costs by \$9,270, a change in retirement system membership by one member will raise costs by \$1,809, and so on.

When observed changes in the exogenous variables are substituted in the equation above, it is possible to determine the impact of changes in employment, real wages, etc. on total costs. The results indicate that 21.4 percent of the increase in expenditures between 1965 and 1972 resulted from increased general employment, 3.7 percent from increased retirement membership employment, 22.8 percent from increased average real wages of all employees, -1.4 percent from wages of retirement system members, 51.0 percent from increases in consumer prices, 0.6 percent from increases in prices of supplies, and 1.8 percent from increases in the contribution rate.

#### EXPENDITURE FORECAST, 1972-1979

The same approach taken to explain these historical trends may be used to project expenditures to 1979. As noted above, this model requires as input, the current employment level, wage rate, pension con-

tribution ratio, and price level and requires estimates of change over the forecast period in each of these variables. The assumed changes in the variables were based on the actual trends over the 1965-1972 period. Since the forecasts were derived using a number of alternative sets of assumptions, a range of projections was derived. The most liberal of these is based upon the assumption that each variable grew at the same rate between 1972 and 1979 that it did between 1965 and 1972, while transfers are assumed to grow at one-half the 1965-1972 rate. The most conservative forecast assumes all variables to grow at 50 percent of the 1965-1972 rate, except transfers which are assumed to grow at one quarter the 1965-1972 rate. Other projections were made where single variables were assumed to grow at the slower rate,<sup>8</sup> so as to show the marginal effect of such a slower growth on the level of 1979 expenditures.

It is important here to draw a distinction between variables which may be influenced by the city government and those which may not. It is assumed that increases in employment, wage rates, and the pension contribution rate are variables upon which city government can exert some influence and, therefore, special attention is paid to the results of altering their growth rates.

To illustrate the nature of the forecast which results, consider the results obtained for the projection of police expenditures. Based on the 1965-1972 trend,<sup>9</sup> New York City police expenditures will double between 1972 and 1979 — from about \$600 million to more than \$1.2 billion (see Table 1). The single variable which has the greatest effect on increasing expenditures is prices — “slow” growth in consumer prices will mean that expenditures will only reach \$1.05 billion by 1979. It should be noted that inflation has an important effect not only on the cost of materials purchased, but also on cost-of-living wage increases which are assumed for all employees. On the other hand, if the growth in the major discretionary variables (E, C, and W) were “slow,” expenditures, would still climb to about \$1.03 billion by 1979. Finally, if the present growth in all the independent variables was halved, police expenditures would still rise to \$880 million (an increase of 46 percent).

By aggregating the forecasts obtained for individual departments, a forecast of total expenditures may be obtained. As is shown in Table 2, if present trends continue, current expenditures could reach \$18.9 billion by 1979 — an increase of more than 120 percent. A slowdown in price growth would cause total expenditures to rise to \$17.5 billion,

<sup>8</sup> Throughout this analysis, “slow” will be taken to mean *half* of the 1965-1972 rate of increase.

<sup>9</sup> Between 1965 and 1972, prices grew at an annual rate of 5 percent, real wages at a rate of 29 percent.

TABLE 1. — New York City Police Expenditures: Forecast to 1979 (in millions of dollars)

Conditions	Type of Expenditure			Total Expenditures <sup>1</sup>
	Labor	Non-labor	Retirement	
Present Trend	\$979.5	\$26.8	\$234.1	\$1,232.4
Slow Employment Growth	886.0	20.5	211.8	1,111.6
Slow Real Wage Growth	913.2	26.8	218.3	1,151.4
Slow Price Growth	836.3	24.7	199.9	1,054.5
Slow Contribution Rate Growth	979.5	26.8	224.3	1,223.2
Slow Real Wage, Employment & Contribution Rate Growth	826.0	20.5	189.2	1,029.5
Slow Growth For All	705.3	18.9	161.5	880.4
1972 Expenditures	\$484.9	\$12.0	\$106.2	\$ 599.1 <sup>2</sup>

<sup>1</sup> Total expenditures may not add exactly to the three components shown here because of certain adjustments to correct for the composition of expenditures in 1979. For a more complete discussion see Roy Bahl, Alan Campbell, and David Greytak; *Taxes, Expenditures and the Economic Base: A Case Study of New York City* (Praeger: forthcoming) Chapter 3.

<sup>2</sup> Includes debt service and unallocated appropriations.

SOURCE: 1972 Labor and total expenditure figures taken from *New York City Executive Budget and Supporting Schedules* (New York: Office of the Mayor, 1972). 1972 non-labor expenditure figures taken from Comptroller of the City of New York, *Annual Report* (New York: Office of the Comptroller, 1972). 1972 retirement expenditure figures derived from Bernard Jump, "The Cost of Providing Retirement and Social Security Benefits to New York City Employees: Trends, Causes, and Prospects, 1961-1972 (Internal Working Paper No. 9, Maxwell Research Project, Syracuse University, Syracuse, New York, Oct. 1972). (The derivation of all other figures, based on 1972 expenditures is described in the text).

TABLE 2. — New York City Government Expenditures: Forecast to 1979<sup>1</sup> (in millions of dollars)

Conditions	Type of Expenditure <sup>4</sup>					Total <sup>2</sup>	Expense Budget <sup>3</sup>
	Labor	Non-Labor	Retirement	Transfer	Total		
Present Trend	\$6,261.1	\$1,339.6	\$1,202.1	\$6,846.3	\$15,649.2	\$18,935.5	
Slow Employment Growth	5,825.0	1,024.8	1,118.4	6,846.3	14,814.6	17,925.6	
Slow Real Wage Growth	5,816.8	1,339.6	1,116.8	6,846.3	15,119.6	18,294.7	
Slow Price Growth	5,345.6	1,212.2	1,026.4	6,846.3	14,430.5	17,460.9	
Constant Contribution Rate	6,261.1	1,339.6	1,264.7	6,846.3	15,711.8	19,011.3	
Slow Transfer Growth	6,261.1	1,339.6	1,202.1	4,682.8	13,485.7	16,317.7	
Excluding Welfare	6,261.1	1,339.6	1,202.1	1,555.5	10,358.4	12,533.6	
Slow Real Wage, Employment & Contribution Rate Growth	5,411.6	1,024.8	1,039.0	6,846.3	14,321.8	17,329.4	
Slow Growth for all	4,620.3	927.3	887.1	4,682.8	11,117.6	13,452.3	
1972 Expenditures	\$3,271.4	\$ 574.9	\$ 662.5	\$2,519.4	\$ 7,028.1	\$ 8,508.1	

<sup>1</sup> Expense Budget.<sup>2</sup> Excludes debt service and unallocated appropriations.<sup>3</sup> Total expenditures may not add exactly to the three components shown here because of certain adjustments to correct for the composition of expenditures in 1979. For a more complete discussion see Roy Bahl, Alan Campbell, and David Greytak; *Taxes, Expenditures and the Economic Base: A Case Study of New York City* (Praeger: forthcoming) Chapter 3.<sup>4</sup> Includes social security and city health insurance.SOURCE: All 1972 expenditure figures taken from Comptroller of the City of New York, *Annual Report* (New York: Office of the Comptroller, 1972). (The derivation of all other figures, based on 1972 expenditures is described in the accompanying text.)

while restriction in real wage and employment growth would only limit expenditures to \$18.3 billion and \$17.9 billion, respectively. The control of the variables,  $E$ ,  $W'$ ,  $P$ ,  $T$ , and  $C$ , would produce expenditures in 1979 of \$13.5 billion — an increase of about 60 percent. Even with the elimination of welfare as a New York City financial responsibility, expenditures would rise to \$12.5 billion in 1979, if all other variables increased at their present rates.

#### CONCLUSIONS

The need for expenditure forecasting, particularly by big city governments, is substantial indeed. If the levels of taxes and expenditures are determined simultaneously, as most would argue, then it seems incorrect to forecast only the tax side of the budget equation. Tax needs can only be evaluated in light of hard estimates of the likely level of expenditures.

One valuable use to which this kind of forecasting model might be put, is to assist government officials in evaluating the budgetary implications of alternative wage and benefit agreements with public employee unions. For example, it is probably reasonable to state that few governments project the long term financing requirements of any given benefit package during the collective bargaining process. A model such as the one presented here would enable government and Union officials to better assess the opportunity costs of increasing the level of public employment as well as employee benefits.

**CHAIRMAN COOK:** Thanks Dick. I appreciate very much the work that each of you gentlemen have done in the course of preparing and presenting these very excellent papers. I also wish to express my appreciation to the many people who came to our session and will again invite each of you to attend our annual committee meeting which is to follow immediately.