Public Employee Market Power and the Level of Government Spending

By PAUL N. COURANT, EDWARD M. GRAMLICH, AND DANIEL L. RUBINFELD*

Recent budgetary rhetoric emanating from Washington and other governmental capitals suggests a growing fear that public spending is getting out of control. For long periods of time the government budget has grown more rapidly than *GNP* in most mixed economies, and observers of these trends have begun to realize that if this process continues, public expenditures will approach very high shares of *GNP* and income tax rates could get close to unity.[1]

These scare stories are counteracted by the simple question that if government gets too large, why can't voters band together to stop its growth? Rational, informed, democratic voting processes should provide a limit to the size of the public sector; indeed they should insure that the public sector is just as large as the voters want it to be. According to what economists have come to know as the "median voter" theory, it is puzzling to know exactly how government spending could ever get too high or out of control.

There have been several attempts to explain the apparent anomaly. The major focus of previous efforts has been on some aspect of bureaucratic aggrandizement, either broadly or narrowly construed. William Niskanen (1971), for example, presents a model in which bureaucracies desire to obtain as large a budget as possible for the bureau in which they are employed. (See also his 1975 paper.) Despite competition from other bureaus, the size of the overall governmental budget is larger than socially optimal because the nature of the budget process allows bureaus to act as price-discriminating revenue maximizers. Their ability to use their market power is constrained, both by competition from other bureaus and by the preferences of relevant legislative committees. As is implicit in the title of his work, *Bureaucracy and Representative Government*, Niskanen's major concern is with the way in which the institutions of representative government (particularly the *U.S.* federal government) may lead to an overprovision of public services. The model is not directly relevant to the behavior of local governments since it ignores two important constraints on local government spending. One is provided by households' opportunity to vote directly on referenda concerning tax collections, and the other by the ability of households to leave local jurisdictions in response to expenditure-taxation packages which they find to be unsatisfactory.[2]

More general in application than Niskanen's work are a number of papers which focus on the ability of public employees to influence the political process so as to increase both wages and the size of the public sector.[3] The implications of this approach have been discussed by a number of authors, but in each case the underlying model has been left unstated or undeveloped. For example, James Buchanan considers the possible ramifications of the right of public employees to vote when he argues:

*Department of economics and Institute of Public Policy Studies, University of Michigan. We would like to thank Theodore Bergstrom, George Borts, Harvey Brazer, Alan Deardorff, Arthur Okun, A. Mitchell Polinsky, and a referee for helpful suggestions.

[1]Much of this rhetoric is contained in popular articles: see Norman MacRae and Jude Wanniski. The relevant formal empirical literature involves a discussion of Adolph Wagner's law by such authors as Richard Wagner and Warren Weber and Richard Bird.

[2]A related approach, emphasized by political scientists but rarely by economists, concentrates on the voting pressure of the clientele groups of government programs. One economist's treatment of this issue is by Richard Craswell.

[3]The idea was treated in passing by Melvin Reder. See also John Pencavel. The empirical work of such authors as Ronald Ehrenberg and Gerald Goldstein, and Sharon Smith is also indirectly relevant.

> Bureaucrats are no different from other persons, and, like others, they will rationally vote to further their own interests as producers when given the opportunity. Clearly their interests lie in an expanding governmental sector, and especially in one that expands the number of its employees. Salaries can be increased much more rapidly in an expanding agency than in a declining or stagnant one. [p. 14]

Buchanan clearly implies that bureaucratic size and market power are highly correlated, but doesn't consider any limits to the growth of government. The dynamics of bureaucratic and governmental growth are also analyzed by Gordon Tullock, who argues that bureaucrats will utilize their market power first to expand the size of the bureaucracy and then to increase wages. Once again, no explicit model is provided to permit consideration of forces that might check the growth of government.

A number of authors have extended the earlier work of Buchanan, Tullock, Niskanen, and others by focusing more specifically on behavioral and motivational differences between public and private employees. For example, Winston Bush and Arthur Denzau cite evidence that voter participation (and presumably support for the public sector) is higher for bureaucrats than for private sector voters, and conclude that higher public sector growth may be the result. A related argument is made in the paper by Thomas Borcherding, Bush, and Robert Spann, who suggest that bureaucrats view public goods as yielding higher (wage) income as well as utility from consumption. If public employees perceive this added dimension as a reduction in the price of public goods, then public employees will opt for a larger public sector.

While certainly not complete, this brief overview of the literature is suggestive. A number of reasons have been given as to why public sector growth might get out of control, without much discussion of the possible checks on governmental growth. As Buchanan and Tullock themselves state, "Presumably there is some limit on this process, but it has not been determined either theoretically or empirically" (p. 150).

In this paper we attempt to respond to the theoretical gap recognized by Buchanan and Tullock by providing a model that permits explicit analysis of some of the issues just raised. The context of the model is a local government beset by growing political and economic power of its own employees on one side, and the threat of mobility of the private sector on the other. As regards the former, it is natural, but not necessary, to view the process in terms of a cohesive public employee union that can bargain for uniform (and high) public wages, and also can choose to vote for a larger public employee work force (though we will see that this particular behavior can be suboptimal). In terms of the classic seller-buyer dichotomy that underlies almost all of economics, to the extent that public employees or their unions gain political power over the budgetary behavior of the jurisdiction, the problem becomes interesting because the suppliers of public goods are in part their own demanders, with the private sector having little to do but pay the bills.

Section I presents the assumptions of the model. Of particular importance is the assumption that public employees have some control over both their own wages and the level of public output. Section II shows how the size of the government budget and its composition between wage rates and employment are determined, first when the private sector workers are the dominant electoral bloc, and then when public sector workers assume control. The main object of interest in this latter case is the ratio of government spending to total income of the community, which will be shown to depend ultimately on the sensitivity of private sector location decisions to the cost of government services. In Section III we deal explicitly with how the competing demands of public and private sector employees might be resolved by a majority rule voting process, noting that public employee bargaining power can alter the level of public employment and public expenditures even when these employees are a minority of the total voting population. This has important implications for the median voter theory, at least in its simplified form, because it argues that even when the median voter is a private employee, the presence of

public sector market power will result in a level of public sector expenditures which is influenced by public sector voting power as well as bargaining power. At the same time, the influence of public employees should be a good deal less than is often claimed in the popular press, because the threat of outmigration by private employees constrains the size of the public budget. In addition, for a given public budget, as the employee work force gets large, public wages must fall. Finally, in Section IV, we conclude by summarizing the implications of the analysis for the question of the controllability of public budgets and suggest some further policy issues that might be examined.

I. Assumptions of the Model

To clarify the analysis which follows, we first list the assumptions used in the paper, grouping them by topic.

ASSUMPTION 1. *Employee Optimization:* All actors in the model are employed in either the public or private sector,[4] and maximize utility functions with the arguments private consumption (C) and public output (E_g). The latter is measured exactly by the level of public employment. This assumption is the basis for the voting and private spending behavior of all employees.

ASSUMPTION 2. *Mobility and Tastes*: We assume that all private sector employees have identical tastes for public and private output, and all public sector employees have identical tastes, though the tastes of the public and private employees will in general not be the same.[5] Since a major theme of the paper is the effect of private sector mobility on the size of the government budget, we assume that although private employees have identical tastes for output, their underlying desires to live in the community vary randomly. When things become sufficiently disadvantageous, those members of the private work force with the weakest desires to live in the community will leave.[6]

ASSUMPTION 3. *Goods and Labor Markets*: We make what might be known as small-country assumptions regarding the behavior of goods and labor markets. Private sector workers produce consumption goods (C) which are sold on a national market at a fixed price which we normalize at unity. All returns from the sale of these consumption goods are distributed equally to the private employees (E_p). Hence the private wage bill W_p (the private money wage) times E_p equals the gross value of private output (C).[7] Over the relevant range, there are no diminishing returns to private sector labor, so W_p remains constant. All private sector workers are assumed to supply labor inelastically as long as they remain in the community.[8]

ASSUMPTION 4. *The Public Sector*: We assume that the government must always balance its budget. Total revenues, the product of a tax rate and the tax base, must equal total expenditures, the product of the number of government employees (E_g) and their

[4]Implicit in this assumption is the existence of some mechanism (such as a union) whereby public employees determine who will work in the public sector. It is further assumed that once in the public sector, all public employees get paid the same wage, which, due to the limitation on entry, could exceed the private sector wage. The model could be extended to deal with seniority rules of various kinds.

[5]If an individual changes sectors, he is assumed to acquire the tastes associated with his current sector, either because of a socialization process or because he now has the same interests as others in his current sector. The assumption of identical tastes within sectors will be relaxed in Section IV, where we consider distributions of tastes. Even there, however, we retain the assumption that if an individual changes sectors his tastes are drawn from the distribution associated with his current sector.

[6]We do not consider the potential mobility of public employees because our major interest is in private sector responses to the exercise of public sector market power. Whatever public employees are likely to do in response to the exercise of such power, it is unlikely that they will leave the community and thus abandon the fruits of their ability to exploit the private sector.

[7]Nonwage income can be incorporated into the analysis by viewing the private wage W_p as the gross pretax income of private workers from all sources, including capital ownership and returns to entrepreneurial services.

[8]It would be possible to incorporate a variable labor supply, but the qualitative results will differ little from those when private workers are free to leave the community.

annual money wage rate (W_g). The nominal tax base is simply total community wage income (both private and public). The tax rate on income is assumed to be proportional and uniform across all employees, though the model could easily be adapted to cases of progressive or regressive taxes. The level of government output (E_g) is determined by the majority voting of utility-maximizing citizens.

ASSUMPTION 5. *Income and the Tax Base*: Since all income in the community is wage income, total income may be represented by an index of wages (W^*) times total employment ($E = E_g + E_p$).[9] Thus,

$$W^*E \equiv W_pE_p + W_gE_g \tag{1}$$

Note that when government employees have no bargaining power, $W^* = W_g = W_p$. With bargaining power, W_g can exceed W_p, and W^* becomes a weighted average of wage rates in the two sectors.

In the competitive case where employees have no bargaining power, all wages are taken as given and the tax base is fixed and independent of the composition of output between the public and private sector. When employees have bargaining power, upward changes in W_g will alter W^*E for two offsetting reasons: a) since private wage rates are fixed by the price of consumer goods, increases in W_g at a given E_g will tend to raise W^*E through the W_gE_g term; and b) since private employees are allowed to leave the community in response to monopolistic behavior by public employees, declines in E_p at a given W_p will lower W_pE_p and thus W^*E.

II. The Model

The results of the model are described by first calculating outcomes when private employees are the dominant voting bloc—giving the standard outcome of prevailing public finance theories. We then contrast these results to those that are obtained when public employees are given control over public output, public wages, or both together.

A. *Private Employees*

Private sector employees are assumed to maximize a utility function of the form

$$U_p = U_p(E_g, C_p) \tag{2}$$

where U_p is the level of utility achieved by private employees when optimizing with respect to the level of public sector employment and private consumption of private employees (C_p). The utility function is maximized subject to the budget constraint

$$W_p = C_p + P_pE_g \tag{3}$$

where P_p is the price that the private employee must pay for the hiring of an additional public servant, and the private employee is assumed to be a price taker with respect to both private consumption goods and public employment.

The price paid by a private sector employee for a unit of public output is equal to the product of the cost of a public employee (the public sector wage, W_g) times the *share* of community-wide taxes paid by the private sector voter. If taxes are assessed on a per capita basis for all N residents of the jurisdiction, this price (W_g/N) is independent of the income of the private sector employee. However, with our assumption of a proportional income tax,[10] the share of wages the private sector voter must pay is W_p/W^*E, where W^*E is the tax base of the community.[11] The price of a public employee is thus given by

$$P_p = W_gW_p/W^*E \tag{4}$$

[9]In effect, we have assumed that both sectors produce output by means of a constant returns-to-scale one-factor technology. Explicit consideration of two-factor production functions in either one or both sectors would both complicate and enrich the model. For example, one could examine a situation in which factor intensities differed in the two sectors, in which case changes in the allocation of labor would induce changes in the private sector wage. While such possibilities could be important, for the sake of brevity we do not treat them here.

[10]This approximates Joseph Pechman and Benjamin Okner's findings for the *U.S.* local government sector.

[11]If wage rates are fixed in the public sector but not the same in both sectors, changes in E_g voted on by private employees will reallocate labor between the two sectors and make a slight alteration in the nominal tax base of the community and therefore in the tax price for private employees. We assume that private employees are unaware of this effect and simply take W^*E as given.

After substituting (4) into (3), we obtain the budget constraint for the private employee:

$$C_p = W_p\left(1 - \frac{W_g E_g}{W^* E}\right) \tag{5}$$

The private employee assumes that the tax base W^*E and the prices he faces are not affected by his actions and maximizes (2) subject to (5). Solving the first-order condition yields

$$\frac{U_1}{U_2} = \frac{W_g W_p}{W^* E} = P_p \tag{6}$$

This is the standard result (appropriate for both voters in political elections and private consumers) that the individual will desire to consume that amount of public goods which equates the marginal rate of substitution with the price ratio.

In the case of the *CES* utility function, for example, the utility function is

$$U_p = [aE_g^{-r} + (1-a)C_p^{-r}]^{-1/r} \tag{7}$$

and the optimal level of public employment of condition (6) is

$$E_g = \left\{\left[\frac{a}{1-a}\right]^{-1/(1+r)}\left[\frac{1}{W_p}\right]^{r/(1+r)} \cdot \left[\frac{W_g}{W^*E}\right]^{1/(1+r)} + \frac{W_g}{W^*E}\right\}^{-1} \tag{8}$$

where $r = (1-s)/s$, s being the elasticity of substitution, and a is the distribution parameter. It is easy to show that E_g is homogeneous of degree zero in all prices. In addition, $\partial E_g/\partial W_g$ will always be negative. The desired level of public employment arising from equations (6) and (8) is equivalent to the level of public output resulting from the familiar median voter model in which the median voter is a private employee. (See, for example, James Barr and Otto Davis; Theodore Bergstrom and Robert Goodman; Borcherding and Robert Deacon.)

B. *Public Employees*

The constrained maximization exercise for public employees is very similar. Employees are assumed to maximize

$$U_g = U_g(E_g, C_g) \tag{9}$$

subject to

$$W_g = C_g + P_g E_g \tag{10}$$

where C_g is the private consumption of the public employees and P_g is the tax price facing public employees; i.e.,

$$P_g = W_g^2/W^*E \tag{11}$$

At this point an important difference arises between the analysis for the public and private sectors. The difference is that while private sector employees take both public and private wages as given and choose their consumption of public goods (and thereby private goods as well), public employees are assumed to have greater choice. We analyze three cases. First, analogous to the private employee optimum, we consider public sector optimization when the public sector wage (W_g) is fixed. Second, we assume that E_g is fixed, and solve to find the wage rate public employees would set if they had unlimited bargaining power. Third, we combine the first two to find the optimum when E_g and W_g are simultaneously determined. Unless otherwise indicated, in all cases it is assumed that the public sector employees acting in concert are aware of the effects of their policies on the tax price which they face (equation (11)).[12]

For a given value of W_g, the optimal level of public employment for public sector employees is found through a straightforward extension of the private employee optimization exercise by substituting (10) and (11) into (9) and maximizing with respect to E_g:

$$\frac{U_1}{U_2} = \frac{W_g^2}{W^*E} = P_g \tag{12}$$

or in the case of a *CES* utility function:

$$E_g = \left\{\left[\frac{b}{1-b}\right]^{-1/(1+r)}\left[\frac{1}{W_g}\right]^{r/(1+r)} \cdot \left[\frac{W_g}{W^*E}\right]^{1/(1+r)} + \frac{W_g}{W^*E}\right\}^{-1} \tag{13}$$

[12]We are implicitly assuming that each public employee is naive in that he does not account for the fact that cuts in public output (i.e., E_g) will imply that there is a certain probability that a given public employee will lose his job and have his wage cut from W_g to W_p. Any attempt to account for this fully would substantially complicate the analysis. However, we might note that our discussion of bargaining strength in Section III does

where b is now the distribution parameter for public employees, but where the elasticity of substitution, $(1/1 + r)$, is the same as in the private case. Comparing (13) with (8), we see that the level of government employment desired by public employees is greater then that desired by private sector employees when

$$(14) \qquad \left(\frac{W_g}{W_p}\right)^r > \left(\frac{1-b}{b}\right)\left(\frac{a}{1-a}\right)$$

In the usual case where $r > 0$ (demands for public expenditures are price inelastic), this condition is met with $W_g = W_p$ and $a < b$ (the basic demand shift parameter is higher for public employees), when $a = b$ and $W_g > W_p$ (the income effect of higher public wages outweighs the substitution effect), or when some combination of the two conditions holds. Differentiating both (8) and (13) with respect to W_g, we see further that

$$(15a) \qquad \epsilon_p = \left(\frac{-1}{1+r}\right)\left(1 + r\frac{W_g E_g}{W^* E}\right)$$

$$(15b) \qquad \epsilon_g = \epsilon_p + \left(\frac{r}{1+r}\right)\left(1 - \frac{W_g E_g}{W^* E}\right)$$

where ϵ_g and ϵ_p are the price elasticities of demand for public and private employees, respectively. Again, when $r > 0$ the public employee demand elasticity will be less negative than that for private employees because the public wage W_g now has a dual effect, raising the price of public goods while also raising the income of public employees.

The second case we consider assumes that E_g is fixed and finds the wage that government employees would prefer if they had unlimited bargaining power. Obviously the fact that employees prefer this wage does not mean they will get it, but it is still fruitful to go through the case to see how the government wage rate and wage bill will tend to move as employees gain bargaining power.

The main limitation on the public sector wage rate in this case is the mobility of the private sector. We assume that there is at least one other accessible community and that public sector wage behavior is not identical in all jurisdictions.[13] To delineate the behavior of private employees further, we assume that each individual's level of utility attained depends not only on the level of public output and private consumption, but also on the characteristics of the community per se (for example, terrain, accessibility to relatives). To summarize this fact, we assume that each individual obtains a *quasi rent* from residence in the community with its unique characteristics. We also assume that there is a distribution of quasi rents, with the quasi rent for each individual given by A^i so that the actual level of utility of individual i is

$$(16) \qquad U_p^i = U_p(E_g, C_p; A^i)$$

where each quasi rent A^i is drawn from a known probability distribution and is strictly separable with respect to the other arguments of the utility function. Assume that each employee decides whether to move by comparing his level of utility U_p^i to the level of utility achievable in the best of all other jurisdictions, $U_p'^i$. If U_p^i is greater than or equal to $U_p'^i$, the private employee remains in the community. If U_p^i is less than $U_p'^i$, emigration occurs.

To simplify the analysis we assume that the parameters A^i are chosen so that private employees can be ranked in terms of the level of quasi rents that they achieve in the original jurisdiction. Specifically, we assume that if $A^i > A^j$ for employees i and j, then $U_p^i - U_p'^i > U_p^j - U_p'^j$. Define A^* to be the minimum value of A^i for all private employees residing in the original jurisdiction, as shown in Figure 1. All citizens with A^i greater than or equal to A^* reside in the community; all with $A^i < A^*$ do not.

Now consider the impact of a change in the public sector wage rate W_g. The gross income earned by public employees ($W_g E_g$) obviously rises, but since the model is open to trade as well as migration, the price of goods sold by the private sector is fixed, as are the gross receipts earned ($W_p E_p$). Hence if there is no

implicitly allow for control over the wage, and thus potential public sector benefits, to vary with the current size of the public sector.

[13]As long as it is possible to incorporate entirely new jurisdictions, as it still is in many states, this assumption will be technically fulfilled; and as long as there are many jurisdictions where relative public sector wages are low, the assumption will be fulfilled in practice.

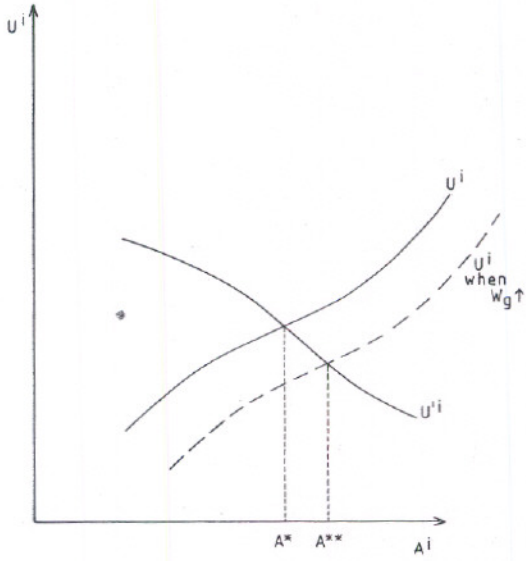

FIGURE 1. MOBILITY OF PRIVATE EMPLOYEES

migration W^*E will rise, but so will the tax rate on private income W_gE_g/W^*E. This increase in the tax rate implies that the consumption of private employees, given by (5) will decline, as will the utility of these employees. This outcome is shown graphically in Figure 1 as a downward shift in the U^i schedule. The result is an increase in A^* to A^{**}, the emigration of all private employees with A^i between A^* and A^{**}, a decline in E, and a decline in W^*E if the percentage decline in E exceeds the percentage rise in W^*.

In the more usual case the rise in W_g will lead to a decline in E_g (according to first-order conditions (6) or (12) above). Private employees then lose utility directly from the drop in E_g and indirectly if C_p falls (i.e., the tax rate rises). This in turn will happen whenever W_gE_g rises, or whenever demands for public services are price inelastic.[14]

[14]The tax rate $W_gE_g/(W_pE_p + W_gE_g)$ obviously rises initially whenever W_gE_g does. If W_gE_g falls, there is a mathematical possibility that this fall in the tax rate would lead to a large enough utility *gain* from the increased C_p to offset the utility loss from the fall in E_g and actually encourage in-migration. This case makes no logical sense, however, because if the private sector could actually benefit from a higher W_g, it would already be paying such a wage.

As a general matter, then, we can assert that for relevant values of W_g, E_g, and W^*, private employment and earnings (W_pE_p) will be negatively related to the public sector wage rate. If public sector employees are rational, they will take this mobility explicitly into account in determining their optimum wage levels, by recomputing the price of government services facing their members (equation (11)) as

$$P_g = \frac{W_g^2}{W^*E(W_g)} \tag{17}$$

where W^*E has been replaced by $W^*E(W_g)$, indicating that the tax base is a function of W_g.

It then becomes important to see how W^*E changes with W_g. There are two offsetting influences: a) the rise in W_g will alter the government wage bill W_gE_g directly; and b) the rise in W_g will reduce private employment E_p and lower the private wage bill and hence the tax base available to public employees. We can summarize these influences by defining the tax base elasticity with respect to public wages as

$$\eta = \frac{dW^*E}{dW_g}\frac{W_g}{W^*E} = \left(W_p\frac{dE_p}{dW_g} + E_g + W_g\frac{dE_g}{dW_g}\right)\frac{W_g}{W^*E} \tag{18}$$

where the first term in the parentheses is clearly negative, the second is clearly positive, and the final term is probably negative but could actually go either way depending on who is setting E_g and the value of r (see equation (15b)). The highest η could be is $+1$ (when $dE_p/dW_g = 0$ and when W_pE_p is very small relative to W_gE_g), but there appears to be no lower bound on the elasticity.

In the case we are considering, E_g is fixed, the third term in the parentheses drops out, and public employees maximize W_g given this level of E_g. This is tantamount to maximizing

$$C_g = W_g\left(1 - \frac{W_gE_g}{W^*E(W_g)}\right) \tag{19}$$

which (differentiating with respect to W_g) yields

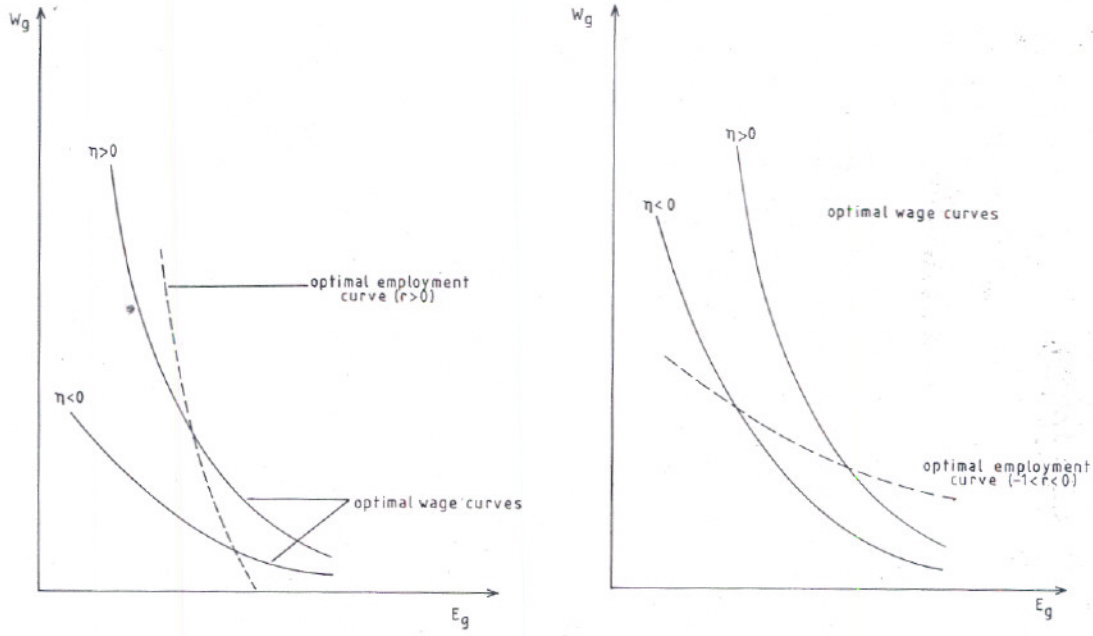

FIGURE 2. OPTIMAL WAGE AND EMPLOYMENT BEHAVIOR WITH MOBILITY

$$\frac{W_g E_g}{W^* E} = \frac{1}{2-\eta} \tag{20}$$

Hence the optimum solution is for employees to set the *entire* government budget as a share of the tax base. Other things equal, as the fixed level of government employment rises, the optimum wage declines. Further, when η is close to its highest attainable value of $+1$, the share of the government budget in the total tax base, $W_g E_g / W^* E = t$, is close to unity: public employees take almost all of total output. But as η becomes negative, the share of government declines gradually. Indeed, in the opposite extreme case where the set of A^i for all private workers is sufficiently close to A^*, the private sector is so mobile and has so much bargaining power that the optimum public sector wage could get driven below the private wage. Again, we can rule out this outcome for logical reasons, because as soon as it begins to happen, public sector employees could also quit their jobs and work in the private sector. Hence (20) should be viewed as giving the upper bound on public wages and W_p as giving the lower bound.[15]

Next we consider the third case in which public sector employees are allowed to set E_g and W_g simultaneously. The first-order conditions (12) and (20) are the same, but now they must be solved simultaneously:

$$\frac{U_1}{U_2} = \frac{W_g}{E_g(2-\eta)} \tag{21}$$

This simultaneous equilibrium is summarized graphically in Figure 2, where in each panel the dotted line is the expenditure first-order condition (12) and the two solid lines are the

[15]With some algebraic manipulation, it can be shown that (21) is exactly equivalent to the first-order condition for the maximization of total tax revenue collected from the private sector, R_p. Since R_p can be written as tW_pE_p,

$$R_p = tW_pE_p = \frac{W_gE_g}{W^*E}(W^*E - W_gE_g)$$
$$= W_gE_g\left(1 - \frac{W_gE_g}{W^*E}\right) = E_gC_g$$

When E_g is fixed, as in this case, the revenue taken from the private sector will be exactly proportional to the consumption of public employees, and maximizing C_g is the same as maximizing R_p.

possible wage first-order conditions (20), with the top line showing the situation where $\eta > 0$ and the bottom solid line showing the wage first-order condition when $\eta < 0$. As η becomes negative, the private sector is more mobile and the optimal wage for any E_g is shifted down. But the wage at which the ultimate intersection between the expenditure and wage condition takes place may be shifted either up or down, depending on public employees' price elasticity of demand for E_g (equation (15b)). If demand is inelastic (as in the left-hand panel), a community with a great deal of mobility (i.e., one in which η is negative) will have lower wages and a higher equilibrium level of government output than will a community with enough mobility so that η is exactly equal to zero. But if demand is elastic (as in the right-hand panel), a counterintuitive result arises: here the community with more mobility actually has a *higher* level of wages and a lower level of public employment than the community where not as much mobility is possible. Hence even though private sector mobility will constrain public employee wage demands at any given level of government employment, the full market equilibrium can lead to some surprising readjustments.[16]

III. Voting and Bargaining

In Sections I and II we described the determination by private and public employees of their desired levels of public employment. In this section we outline a resolution to the conflicting desires of private and public employees by introducing a simple majority-rule voting mechanism. In order to enrich the analysis we drop the assumption that the tastes of private and public employees are identical within groups, and instead assume that public and private employees have known distributions of tastes, which are in general different from each other. Thus, the analysis of desired levels of W_g and E_g now becomes an analysis of the levels desired by the median (or, more generally, the decisive) member of each group, and we assume that the chosen level of public output is equal to the desired level of the median voter.[17]

Consider first the case in which the public sector has a fixed amount of bargaining power and there is no mobility. Real wages in the public and private sectors are not necessarily equal—they could be higher in the public sector—but they are independent of current expenditure demands and the composition of employment in the community. In this case both sectors can be assumed to know W_g and W_p and vote for their optimal level of E_g, given for the private sector in equation (6) and for the public sector in (12) (where these now give the levels chosen by the decisive member of the respective groups). In general the two expressions imply different demands for public employment for three reasons: a) if relative wages differ, incomes differ and the income effect will lead to different public employment demands; b) if relative wages differ, tax prices differ and the substitution effect may lead to different demands; and c) the basic parameters of the utility function may not be the same.

If W_g is in excess of W_p, consideration a) would induce public employees to vote for larger public employment, consideration b)

[16]A plausible argument can be made that this case is unstable, while the inelastic demand case is stable. If, for example, moving expenditures were lowered so that η drops, W_g might begin falling as public employees recompute their first-order condition. This moves us toward equilibrium in the left-hand panel of Figure 2 and away in the right-hand panel.

[17]It should be noted that voting is only one of several political mechanisms (say, campaign contributions) which might affect the determination of the level of public employment, and some of the other mechanisms are likely to be more effective from a political point of view. In addition to political mechanisms, there is also the possibility of resolving conflicting demands by using the familiar economic condition for optimal provision of public goods. In the context of our model, this would require finding the public sector wage W_g such that with proportional income taxes the levels of E_g chosen by both public and private employees would be the same; i.e., the tax prices for each group would be the Lindahl prices. In the *CES* example, this condition can be examined by making inequality (14) an equality and solving for W_g as a function of the relevant parameters. In the case where public employees have some wage-setting power, the notion of a Lindahl solution seems to us to have little meaning, since the level of W_g is the instrument by which one party exploits another, and hence is hardly agreeable to the private employee.

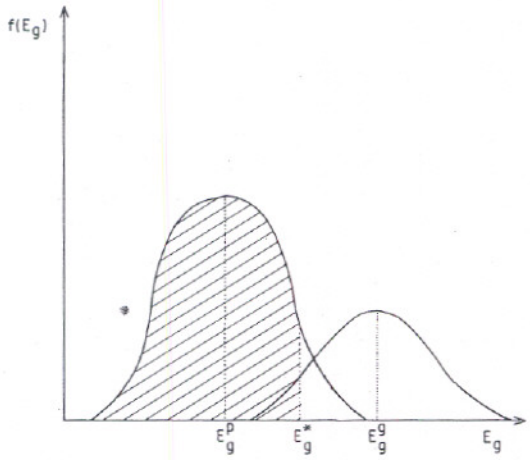

FIGURE 3. DISTRIBUTION OF VOTERS FOR PUBLIC EMPLOYMENT

suggests smaller, and consideration c) is ambiguous, but probably dictates larger public employment. Regarding the latter, public employees might be sympathetic to the services they produce or have a job security motive where their own security depends on their seniority, which in turn would depend positively on the size of the public employee work force. As long as the substitution effect of higher public wages is small, and public employees have strong tastes for public output, they will vote for larger public employee work forces than will private employees, as shown in Figure 3.[18]

In light of these considerations we assume the median private sector voter will want a smaller public work force (E_g^p) than the median public employee (E_g^g). As long as E_g is less than half of E, there will more private sector workers (larger area) and the voting mechanism will result in an employment level between E_g^p and E_g^g, closer to the median of the private employee distribution, where the shaded area includes exactly one-half of the total voters and E_g^* represents the vote of the median voter of the entire resident population. Note that the median voter is either a private employee with a strong taste for public output (relative to that of other private workers) or a public employee with a weak taste for public output (relative to that of other public employees).

The question becomes somewhat more intricate when we realize that wage bargaining strength might also be endogenous. Once the public employee work force rises to some critical level, these employees become strong enough to influence elections, and it does not take an extreme cynic to imagine political candidates attempting to bribe unions into supporting the "right" party either with high wage increases or with the promise of institutional changes that facilitate future union bargaining.[19] We might assume that when the public sector is very small, public employee wages are set competitively at W_p, but that as E_g grows, public employees have progressively more power in moving to their desired wage given in (20). But there is a catch here: recall that (20) implies $W_g = W^* E/E_g(2 - \eta)$. As soon as E_g rises to the value of $E/(2 - \eta)$, the *optimal* wage desired by public employees is equal to the wage received in the private sector. Hence the maximum ratio of W_g to W_p will be achievable at a value of E_g between 0 and $E/(2 - \eta)$. This is shown in Figure 4 as a result of a political weighting of the competitive wage line ($W_g = W_p$) and the optimal wage line of expression (20). If $\eta > 0$, the range of E_g/E for which $W_g > W_p$ will extend past $E/2$, implying that public sector workers could simultaneously have a small enough sector to raise their wages and a large enough voting bloc to achieve their wage and expenditure objectives. But in general η is probably less than zero and the optimum economic level of E_g, that at which W_g is maximized, is almost certainly a good deal less than the optimum political level of E_g (where the voting influence is strong enough that workers can achieve their wage first-order condition).

The preceeding discussion is both similar to and different from Tullock's "Dynamic Hypothesis on Bureaucracy." Like Tullock, we have assumed that bureaucrats' political power is endogenous, and can be expected to

[18]Note that when utility functions are Cobb-Doublas ($r = 0$), the income and substitution effects exactly offset each other and the respective voting tendencies depend only on consideration *c*.

[19]That this actually happens in the world can be seen from a discussion of the history of union wage negotiations in New York City, see Raymond Horton and Gramlich.

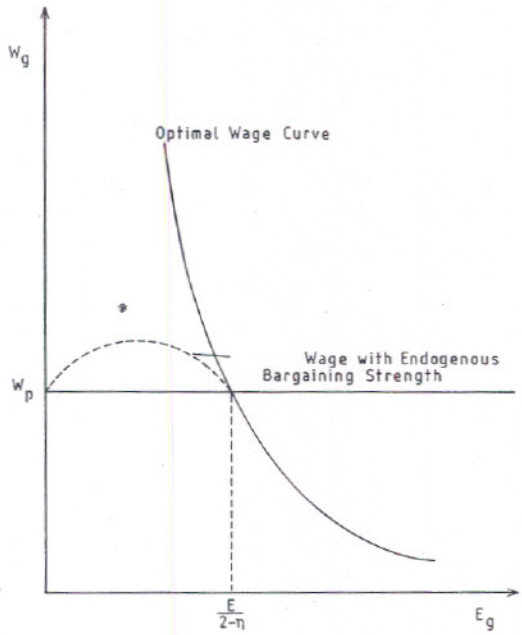

FIGURE 4. RELATIVE WAGES FOR THE PUBLIC SECTOR

be increasing in the fraction of the population which is employed in the public sector. But our analysis differs from his in one important respect: he suggests that bureaucrats will use an increasing fraction of their power to raise public sector *wages* as their employment rises. In our model this is not possible beyond some point, because the public employee's own *optimum* wage *decreases* as the level of public employment rises. Furthermore, the downward-sloping optimum wage curve is inherent in the technology of "exploitation" of the private sector—even if all of private sector income could be expropriated and there were no mobility (i.e., η approaches unity), the amount of such income available to each public employee must perforce be decreasing in the number of public employees. Thus, while we agree with Tullock that public employee *political power* will increase in the level of public employment, the ability of public employees to convert that power into high wages will be attenuated both by the mobility of the private sector and by the simple arithmetic of "dividing up the pie."

Putting things in this light implies that even a strong public sector union should ultimately be controllable. Since the total government budget desired by public employees is constrained by private sector mobility, public sector monopolies interested in maximizing the individual employee's wage will find it economically optimal to aim at a share of total employment that should be substantially less than $E/2$. As long as voting participation rates are the same among public and private sector employees, this assures that the public sector worker-voters will remain a minority. Moreover, there are two other constraints on behavior which temper public employee power even further: a) public employees themselves will be schizophrenic in the sense that their own public-private spending desires (equation (12)) may conflict with the E_g solution of Figure 4; and b) private sector employees may learn that increases in E_g increase the risk that the public sector can move toward its optimal wage curve, and these private employees may take this as another constraint in their own voting.

IV. Implications

At this point it may be helpful to return to the original message and pull together what this model has to say about it. The original fear was that as public servants are hired, they would become a steadily more dominant electoral force, elect politicians who would grant them steadily more market power, and the upshot of the rising levels of E_g and W_g would be steadily greater public budgets and higher tax rates. The public sector becomes dominant and the private sector is struggling, maybe unsuccessfully, for survival.

This model tries to put these fears in perspective by treating them analytically. The major conclusion is that as long as the private sector retains its right to leave the community, and as long as all communities are not suffering high and rising tax rates, public sector monopolies ought to be kept in check by the simple optimizing behavior of these same public employees.[20] It shows further

[20]This does not mean to imply that public sector unions always perform their optimization calculations correctly. A plausible interpretation of the recent history of New York City, for example, would be that the municipal unions' estimate of η was well above the true value of that

that the optimum public wage depends inversely on the size of government employment. Adding public employees may increase the political strength of unions but it also decreases the wage they will desire to attain. Finally, on the demand side, both public and private voters in their expenditure demands will also be price sensitive. As public employees try to enforce higher levels of public sector wages, private voters will force down the share of public employment, which should reduce even more the chance the public sector monopolies will be able to raise wages and exploit the private sector.

REFERENCES

J. L. Barr and O. A. Davis, "An Elementary Political and Economic Theory of Local Governments," *Southern Econ. J.*, Oct. 1966, *33*, 149–65.

T. C. Bergstrom and R. P. Goodman, "Private Demands for Public Goods," *Amer. Econ. Rev.*, June 1973, *63*, 280–96.

R. M. Bird, "Wagner's 'Law' of Expanding State Activity," *Publ. Finance*, No. 1, 1971, *26*, 1–26.

T. E. Borcherding and R. T. Deacon, "The Demand for the Services of Non-Federal Governments," *Amer. Econ. Rev.*, Dec. 1972, *62*, 891–901.

———, W. C. Bush, and R. M. Spann, "The Effects of Public Spending of the Divisibility of Public Outputs in Consumption, Bureaucratic Power, and the Size of the Tax-Sharing Group," in Thomas E. Borcherding, ed., *Budgets and Bureaucrats: The Sources of Government Growth*, Durham 1977.

J. Buchanan, "Why Does Government Grow?," in Thomas E. Borcherding, ed., *Budgets and Bureaucrats: The Sources of Government Growth*, Durham 1977.

——— and G. Tullock, "The Expanding Public Sector: Wagner Squared," *Publ. Choice*, Fall 1977, *23*, 147–50.

W. C. Bush and A. T. Denzau, "The Voting Behavior of Bureaucrats and Public Sector Growth," in Thomas E. Borcherding, ed., *Budgets and Bureaucrats: The Sources of Government Growth*, Durham 1977.

R. Craswell, "Self-Generating Growth in Public Programs," *Publ. Choice*, Spring 1975, *21*, 91–98.

R. G. Ehrenberg and G. S. Goldstein, "A Model of Public Sector Wage Determination," *J. Urban Econ.*, July 1975, *2*, 223–45.

E. M. Gramlich, "The New York City Fiscal Crisis: What Happened and What is to be Done?," *Amer. Econ. Rev. Proc.*, May 1976, *66*, 415–29.

Raymond D. Horton, *Municipal Labor Relations in New York City: Lessons of the Lindsay-Wagner Years*, New York 1973.

Norman MacRae, *America's Third Century*, New York 1976.

William A. Niskanen, "Bureaucrats and Politicians," *J. Law Econ.*, Dec. 1975, *18*, 617–43.

———, *Bureaucracy and Representative Government*, Chicago 1971.

Joseph A. Pechman and Benjamin A. Okner, *Who Bears the Tax Burden?*, Washington 1975.

J. H. Pencavel, "The Demand for Union Services: An Exercise," *Ind. Labor Rel. Rev.*, Jan. 1971, *24*, 180–90.

M. W. Reder, "The Theory of Employment and Wages in the Public Sector," in Daniel S. Hamermesh, ed., *Labor in the Public and Nonprofit Sectors*, Princeton 1975.

S. P. Smith, "Government Wage Differentials," *J. Urban Econ.*, July 1977, *4*, 248–71.

G. R. Tullock, "Dynamic Hypothesis on Bureaucracy," *Publ. Choice*, Fall 1974, *19*, 127–31.

R. B. Victor, "The Effects of Municipal Unionism on Wages and Employment," unpublished doctoral dissertation, Univ. Mich., 1977.

R. E. Wagner and W. E. Weber, "Wagner's Law, Fiscal Institutes, and the Growth of Government," *Nat. Tax J.*, Mar. 1977, *30*, 59–68.

J. Wanniski, "Taxes, Revenues, and the 'Laffer Curve'," *Publ. Interest*, Winter 1978, *50*, 3–16.

parameter. Moreover, in constantly comparing their own wage levels to wage levels in other cities where the size of the public employee work force is smaller, these employees are hurting both the private sector (because the price of public services is raised) and ultimately themselves (because the tax base is falling).