The simple analytics of slack-maximizing bureaucracy

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Abstract. Using a utility-based graphical model of bureaucratic choice, this paper develops four empirical predictions from the theory of slack-maximizing bureaucracy. These predictions are compared to those resulting from the Niskanen budget-maximizing model of bureaucracy. Slack-maximizing and budget-maximizing bureaucracies are similar in their response to changes in cost and in their generation of "flypaper effects", but they differ in their responses to matching and lump-sum grants.

1. Introduction

Since the publication of *Bureaucracy and Representative Government* (1971), analysts have debated Niskanen's simple assumption of budget-maximization. This controversy has arisen because the bureaucrat confronts his legislative sponsor with an all-or-nothing choice, and all-or-none demand curves are always elastic (see Patinkin, 1963, and Section 2 below). Therefore, to maximize the size of his budget, a bureaucrat would have to reduce the price charged to the sponsor to the level of his costs, eliminating productive inefficiency. This means that there would be no discretionary funds available for increased staff, perquisites of office, high salaries, etc., over and above what is minimally required to produce the services of the bureaucracy (Migue and Belanger, 1974).

As a result of this facet of Niskanen's model, a number of writers have proposed "slack-maximizing" models of bureaucracy (see Migue and Belanger, 1974; Breton and Wintrobe, 1975; and Gonzalez and Mehay, 1985). In these models, the bureaucrat tries to maximize the difference between his revenue and the minimum cost of production. Following Cyert and March (1963), I will call this difference "organizational slack", although Migue and Belanger call it "discretionary profit" and Orzechowski (1977) uses the term "fiscal residuum". This slack can then be used to purchase whatever non-productive expenditures the bureaucrat desires. The slack-maximizing approach also incorporates the models of Williamson (1964) and others, in which the bureaucrat wishes to maximize his staff. Under Williamson's assumption, the bureaucrat maximizes organizational slack and turns the whole of this slack into extra personnel.

Niskanen has carefully detailed the empirical consequences of budget-

maximizing bureaucracy on the expenditure patterns of the sponsor, but no similar analysis has been done for slack-maximizing bureaucracy. As a result, it is impossible for empirical analysts to tell if a slack-maximizing bureaucracy is operating, or whether a particular bureaucracy is budget- or slack-maximizing. This paper tries to fill this gap. Using a simple graphical model of expenditures, the four major empirical effects of slack-maximization are derived. For comparison purposes, equivalent results for budget-maximizing bureaucracy are also detailed. I conclude that there is surprisingly little empirical difference between slack-maximizing and budget-maximizing bureaucracies, so that in many circumstances it will not be necessary to pin down the bureaucrat's motives to predict his behavior well. There are, however, two empirical differences that can be used to discriminate between slack-maximizing and budget-maximizing bureaucracies if the analyst is interested in that question.

2. Equilibrium conditions

One major difficulty with previous graphical models of bureaucracy is their reliance on the sponsor's ordinary demand curve for analysis. The bureaucrat's position is taken to be similar to that of an ordinary private monopolist, in which consumers can choose the amount of a good they wish to purchase at any given price. The difficulty, of course, as pointed out by Niskanen, is that the sponsor trades a budget for a level of output without the opportunity for marginal changes in the level of consumption. Because of an information advantage and/or agenda control, the bureaucrat presents the sponsor with an all-or-nothing choice. This choice, therefore, is fundamentally different from that presented by an ordinary monopolist.

Most analysts have recognized the nature of this all-or-nothing choice, and have tried to incorporate this fact into their ordinary-demand-curve based analysis. But the ordinary demand curve is fundamentally inappropriate for this work, because it is based on the assumption that consumers are able to make marginal changes. This means that it is impossible to derive all of the empirical consequences of bureaucracy using ordinary demand curves. The alternative is to use all-or-none demand curves, or as is done below, use the sponsor's indifference curves as the primary units of analysis. McGuire (1973) pioneered the use of indifference curves to predict the responses of bureaucracy to changes in its environment.

Figure 1 shows the equilibrium conditions for the slack-maximizing and budget-maximizing bureaus. Let the term "cost" represent the true minimum resources necessary to produce the public good, which will be lower than the price charged to the sponsor in the case of slack-maximizing bureaucracies.
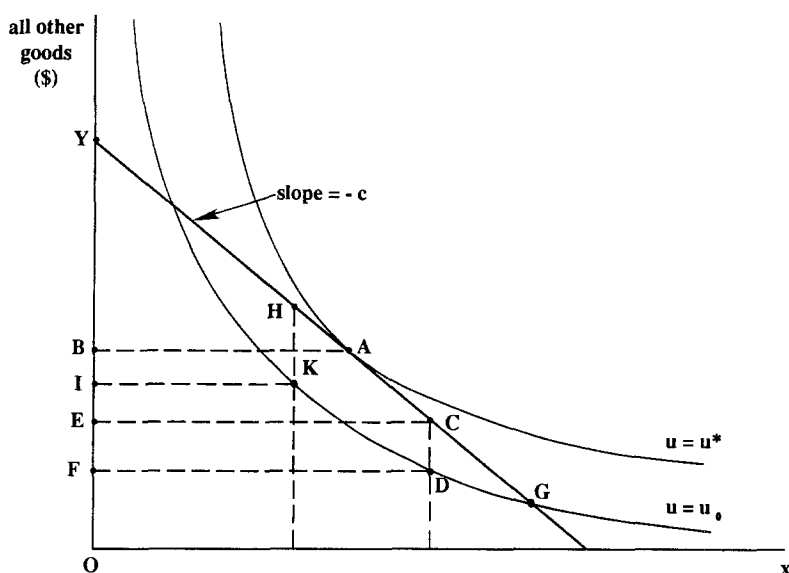
Figure 1. Equilibrium conditions.

Further, let c be the (constant) per-unit cost of the good. The sponsor is assumed to divide his income between the good produced by the bureaucracy (x) andn all other goods, with the latter measured in dollars. Point A describes the equilibrium conditions under competitive provision of x (for example, when the sponsor can choose from several private firms that produce the good). The sponsor finds a tangency between his budget line (which has a slope of -c and an all other goods intercept equal to his income Y) and his highest possible indifference curve $u = u^*$. Because all other goods is measured in dollars and OY represents the sponsor's income, OB must represent the sponsor's spending on all other goods and (by the budget constraint) BY must represent his spending on x.

Point D is a representative point available to the bureaucrat. The bureaucrat uses his information advantage and/or agenda control to confront the sponsor with an all-or-nothing choice, forcing the equilibrium point to move in two dimensions. First, the bureaucrat can force the sponsor to buy more or less of the good than he might like (moving him along his budget constraint); and second, he can charge the sponsor more than the true cost of the good (thus moving the budget point off the budget constraint). (The bureau's ability to generate organization slack forces us to be more precise in our use of the term "budget constraint"; in this context, we mean the set of all bundles of x and all other goods which would exhaust the sponsor's budget *if the sponsor were charged only for the true cost of producing x.*) The bureaucrat's budget and slack expansion is limited, however, by the fact that the sponsor must achieve

a utility level equal to u_0. the level he obtains without bureaucratic provision of the good. In some cases, the alternative to bureaucratic provision is doing without the good entirely; in other cases, this will mean using private good substitutes like private security guards and volunteer fire departments. In Figure 1, I have assumed that private substitutes are available, so that the no bureaucracy option involves positive x output and all other goods consumption less than Y; if this were not the case, the u_0 indifference curve would cut through the all other goods axis at the Y intercept.

At point D, the following geometry establishes that the cost of producing the good is given by distance YE:

(distance YE)/(distance EC) = slope of budget line
$$= c \tag{1}$$

Hence

distance YE = c(distance EC) = cx
$$= \text{total cost of x} \tag{2}$$

The bureaucrat's budget is represented by distance YF, leaving organizational slack of EF. To achieve utility level u_0 at the given level of x, the sponsor must retain OF to spend on all other goods.

Point G is the budget-maximizing point. To maximize his budget (the vertical distance between Y and a new point F), the bureaucrat moves down and to the right along indifference curve u_0. However, the bureaucrat is limited by the constraint that his revenues at least cover his costs. Bureaucratic budget expansion therefore stops at point G because beyond that point the costs of production would exceed the proposed budget. Note that point G involves a larger budget and greater output than point A, the sponsor's preferred output, but no organizational slack.

Point K is the slack-maximizing bureaucratic point. Under slack-maximization, the bureaucrat seeks a point on the indifference curve that maximizes the difference between revenues and the cost of producing x. Geometrically, the bureaucrat seeks that level of output which maximizes the vertical distance between the budget line and indifference curve $u = u_0$. This must occur where the slope of the indifference curve is equal to the slope of the budget line; otherwise, a small movement to the left or right would increase organizational slack. Note that point K involves a larger budget (YI) than the sponsor would choose on his own, but smaller output and total costs than point A.
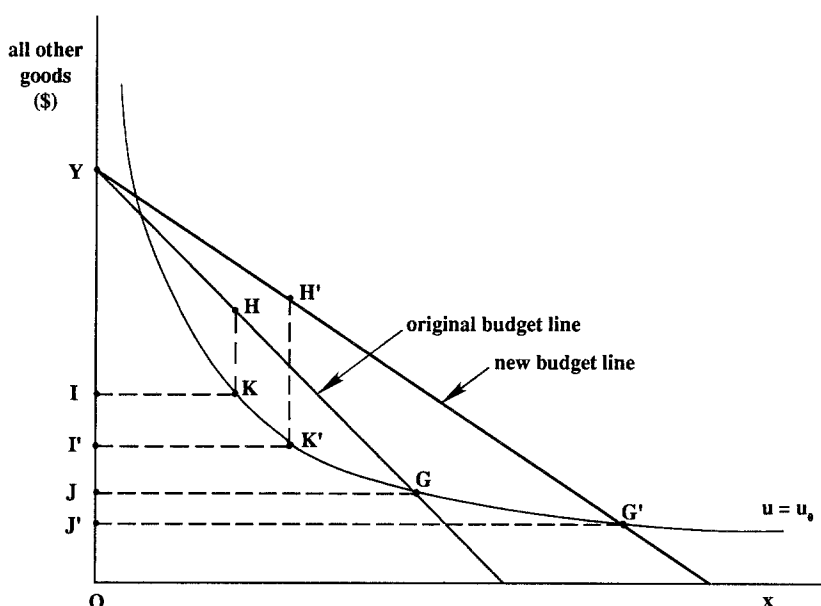
Figure 2. Elasticity of demand.

3. Elasticity of demand

Figure 2 shows that, for both the slack-maximizing and budget-maximizing cases, the estimated demand curve will always be cost elastic. More precisely, if we measure the elasticity of demand by comparing expenditure levels of the bureau at different levels of cost, we will always conclude that the demand curve is elastic.

In Figure 2, the cost of x falls, forming a new budget line. The budget-maximizing point shifts from G to G', and the budget of the bureau increases from YJ to YJ'. Since a fall in cost leads to an increase in expenditure, the underlying demand curve must be elastic. Similarly, the slack-maximizing point goes from K to K', reflecting increased output. (This must be the case, because the point on indifference curve $u = u_0$ which has the same slope as the new, flatter budget line must be down and to the right from the corresponding point under the old budget line.) The budget of the slack-maximizing bureau rises from YI to YI'. Again, since a fall in cost leads to an increase in expenditures, the underlying demand curve must be elastic.

For intuition behind these results, we return to the equilibrium conditions of Section 2. The budget-maximizing bureaucrat obeys no standard marginal conditions; his constraint is simply that revenue must cover costs. More precisely, in the initial equilibrium, the amount the sponsor can be forced to pay
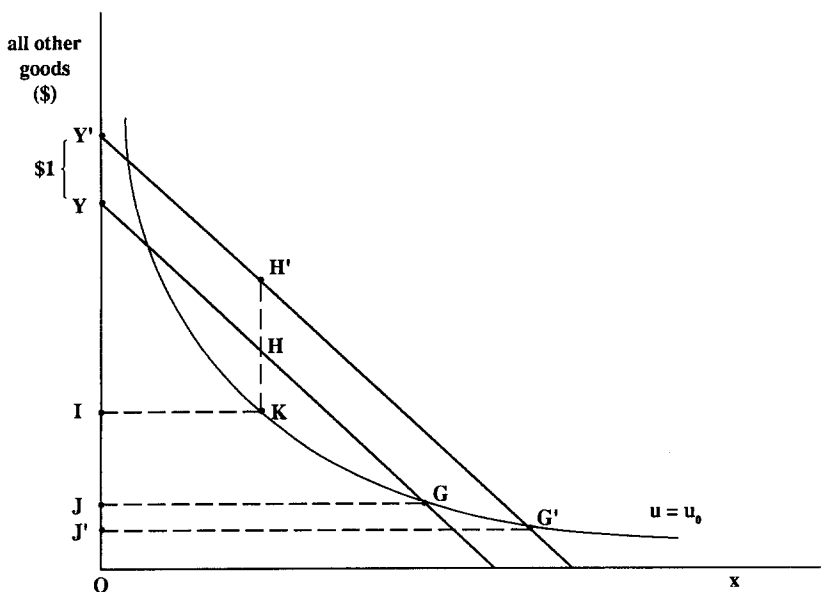
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Figure 3. Lump-sum grant effects.

for additional units of x, even under the threat of losing bureau output entirely, is less than the cost of those additional units. As the cost of the units declines, however, the bureaucrat now finds that the revenue from the sponsor for those additional units does cover their costs, and both output and the budget expand.

For the slack-maximizer, the intuition is to remember that the only income left to the sponsor is the amount necessary to buy enough of all other goods to get him to utility level u_0. When the cost of x falls, the bureaucracy buys more of x and the sponsor therefore needs less of all other goods. His expenditure on all other goods therefore falls, and given the same income, the amount spent by the bureaucracy increases.

4. Lump-sum grant effects

Figure 3 illustrates one empirical difference between slack-maximizing and budget-maximizing bureaus: their responses to lump-sum grants. Suppose, following Niskanen, that the bureau is of "mixed" type, receiving revenue from both the government (in the form of a grant) and from service recipients. Alternatively, following Beck (1981) or Wyckoff (1988a), suppose that the bureau's sponsor is a state or local government which receives intergovernmental grants from higher levels of government. In either case, the exogenous lump-sum

grant sets off a comparative static change which reveals the nature of the bureau.

In Figure 3, the lump-sum grant has been normalized to a value of $1 for clarity. The budget line shifts out parallel to the old line, with the vertical distance between the lines equal to $1. The budget-maximizing bureau shifts its equilibrium from point G to point G', increasing expenditures from YJ to Y'J'. Since YY' is equal to one dollar, the total increase in spending must exceed one dollar by the amount JJ'. The central result, then, is that a one-dollar increase in lump-sum aid increases expenditures by more than one dollar.

Conceptually, it is easiest to think of the sponsor initially turning over the entire one dollar grant to the bureaucrat. The budget-maximizing bureaucrat, since he is productively efficient, uses that one dollar to increase output by $1/c$ units. But that additional output increases the sponsor's utility above the initial level u_0. This additional utility creates the opportunity for the bureaucrat to expand the budget even further, forcing the sponsor to give up more of all other goods in exchange for more x. While x continues to have positive utility for the sponsor, he would prefer not to pay for additions to the already excessive levels of x, so this action reduces his utility back to u_0, restoring equilibrium.

By contrast, one dollar of lump-sum aid increases the expenditure of a slack-maximizing bureau by *exactly* one dollar. In Figure 3, the lump-sum aid does not change points K or I at all. Originally, the indifference curve was parallel to the budget constraint at point K, and the parallel shift in the budget line maintains this relationship after the lump-sum aid increase. The expenditure on x therefore increases from YI to Y'I, an increase of one dollar.

Once again it is useful to think of the bureaucrat receiving a budget increase of one dollar as a preliminary allocation of the lump-sum grant. In this case, the slack-maximizing bureaucrat simply transforms that increase into increased staff, higher salaries, better working conditions, and so on, with no increase in output. In contrast with the budget-maximizing case, however, there is no tendency for the system to move from this preliminary point. The sponsor still continues to enjoy just as much x and all other goods as before, so he continues with utility level u_0. Ordinarily, the bureaucrat continually seeks out ways alter his budget in the hope of getting the sponsor to utility level u_0 at lower total expense, thus leaving more resources for bureaucratic slack. However, under the lump-sum grant, the relative costs of x and all other goods haven't changed, so there is no incentive for further changes in the budget.

5. Lump-sum vs. matching grants

Figure 4 illustrates another difference between budget-maximizing and slack-maximizing bureaucrats: on a dollar-for-dollar basis, budget-maximizers show
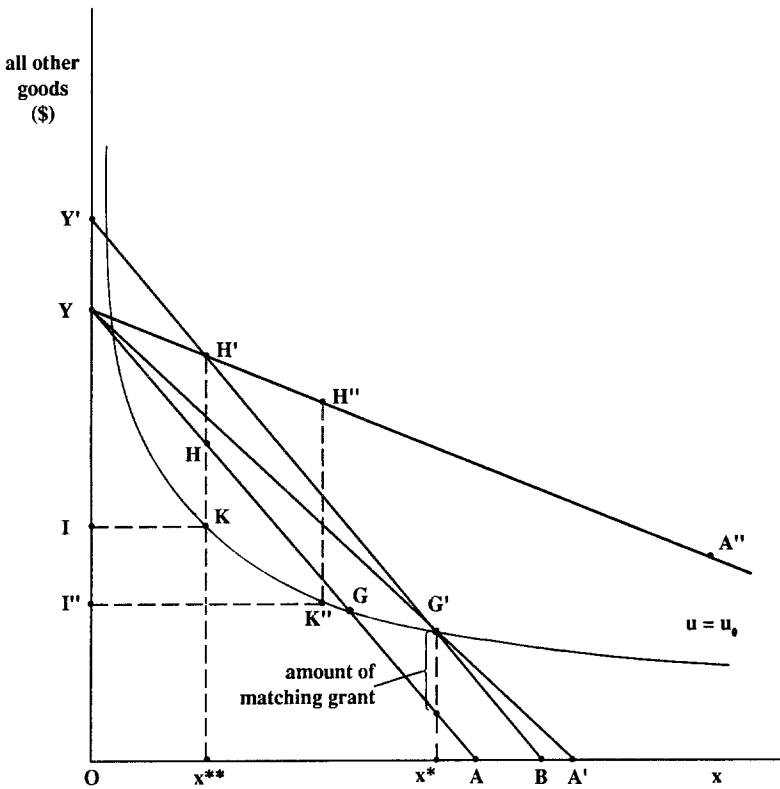
Figure 4. Lump-sum vs. matching grants.

exactly the same reaction to matching grants as lump-sum grants, while slack-maximizers do not. These results are applicable to both mixed bureaus, who might receive their grant from the government in either a lump-sum or per-unit form, and state or local government bureaus, who face both matching and lump-sum grants from higher levels of government.

Picking up from Figure 3, Figure 4 shows the effects of a lump-sum grant once again. The budget-maximizing bureau moves from point G on the original budget line YA to point G' on the new budget line Y'B. Now, suppose that we remove this lump-sum grant and replace it with an equivalent matching grant. Since the amount of the matching grant is endogenous, the term "equivalent" must be carefully defined. In the literature on intergovernmental grants, a matching grant is usually said to be equivalent to a lump-sum grant if, at the level of x formerly chosen by the jurisdiction, the community would get the same amount of aid under the matching grant as under the lump-sum grant. In Figure 4, this demands that at the level of x represented by x*, the vertical distance between the original and matching-grant-aided budget lines

(which represents the amount of the aid) must be the same as under the lump-sum grant. Such a matching grant scheme is represented by the budget line YA'.

Contrary to the case without bureaucratic provision, equilibrium under budget-maximizing bureaus is exactly the same under the two kinds of grants. Both grant systems lead to an equilibrium at point G'. This is because the budget-maximizing bureaucrat is constrained only by the fact that revenues must equal costs. Therefore, all grants that increase revenues by the same amount have exactly the same effect. The budget-maximizing bureaucrat obeys no conventional marginal conditions, so changes in the marginal cost of the good have no effect except in their impact on revenue.

By contrast, the slack-maximizing bureaucrat is very sensitive to marginal changes in cost. Recall that, under a lump-sum grant, the bureaucrat maintains equilibrium at point K and simply increases slack by the amount of the grant. Once again, let us remove the lump-sum grant and construct an equivalent matching grant. This is a matching grant which, at the level of x represented by x**, gives the sponsor the same aid (and hence the same vertical distance between the original and aided budget lines) as under the lump-sum grant. Such a budget line is YA''. Under the matching grant, however, the slack-maximizer would not continue to choose point K; instead, the new budget line and the indifference curve would be parallel at a point like K''. For the slack-maximizer, then, lump-sum and matching grants do *not* have the same dollar-for-dollar impacts. Matching grants have a price as well as an income effect; the lower cost of x changes the cost-minimizing mix of x and all other goods required to bring the sponsor to utility level u_0, so the change in the budget is different than under the lump-sum grant.

6. Lump-sum grants vs. income increases

Finally, I turn to a result which is peculiar to the intergovernmental aid case: the comparison between the effects of lump-sum grants and increases in sponsor income. Empirical studies commonly show that lump-sum aid increases cause more growth in expenditure than increases in the sponsor's income that result in the same the budget line. This result has come to be known as "the flypaper effect", because public sector money tends to stick in the public sector and be spent there, while private income tends to stick in the private sector. Wyckoff (1988a) contains a theoretical explanation of this effect for budget-maximizing bureaus and an empirical test of this explanation; here I extend the theory to slack-maximizing bureaus.

The root of the explanation is to notice that, while lump-sum aid and income increases have the same effect on the budget line, they do not have the same
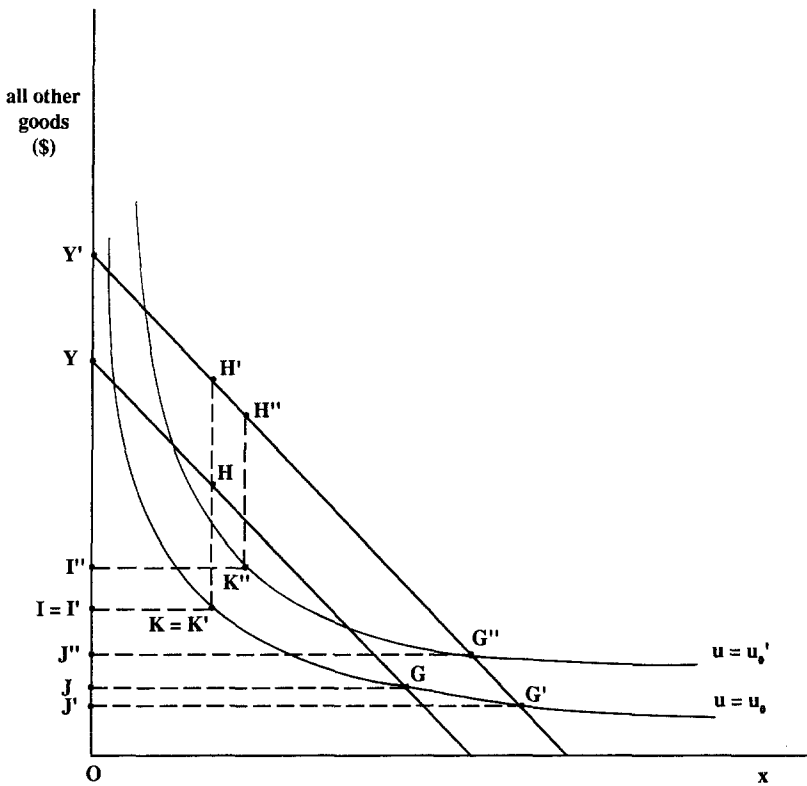
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Figure 5. Lump-sum grants vs. income increases.

effect on the sponsor's utility level without bureaucratic provision, u_0. Income increases improve the sponsor's utility without bureaucratic provision, pushing up u_0, while lump-sum aid does not. This causes an asymmetry between lump-sum aid and income increases.

In Figure 5, a lump-sum aid increase moves the budget-maximizing equilibrium from G to G'. An income increase has the same effect on the budget line, but also increases the sponsor's reversion level of utility from u_0 to u_0'. For the citizens of a state or local government, the next best alternative to bureaucratic provision in one jurisdiction is to move to another community. With an income increase, the extra income will be useful in that alternative location, so u_0 must increase. On the other hand, if a citizen moves out of the jurisdiction, increases in lump-sum aid in his former community have no effect on him, so u_0 is unaffected by lump-sum aid. If the sponsor's utility function is responsive to those of the citizens in the jurisdiction, then, there will be a difference in u_0 under the two cases. Therefore, the equilibrium under income increases will be like G'' rather than G'. Instead of increasing form YJ to Y'J', there will be a smaller increase from YJ to Y'J''.

Table 1. Summary of results

Type of provision	Cost elasticity of demand	Effect of $1 lump-sum grant	Lump-sum vs. matching grants	Lump-sum grants vs. increase in sponsor's income
Competitive supply	No restriction	Less than $1 increase in expenditure*	No equivalence between two types of grants	Identical effects on spending
Budget-maximizing bureaucracy	Cost elastic	Greater than $1 incrcase in expenditure	If grant amounts are the same, effects are identical	Lump-sum grants stimulate more spending
Slack-maximizing bureaucracy	Cost elastic	$1 increase in expenditure	No equivalence between two types of grants	Lump-sum grants stimulate more spending

* assuming that the sponsor's income elasticity of demand is less than infinite.

Similar results occur in the slack-maximizing case. A lump-sum grant leaves the slack-maximizer at point K. An income increase, however, because it affects the sponsor's reversion level, moves equilibrium to a point like K″. Rather than increasing from YI to Y′I, expenditures increase only from YI to Y′I″.

7. Conclusions

Table 1 summarizes the results of this analysis. Slack-maximizing and budget-maximizing bureaucracies are similar in their price elasticities and their generation of flypaper effects, but they differ in their responses to lump-sum grants and their relative responses to lump-sum and matching grants.

The important question for the empirical investigator, of course, is whether these differences matter for his research. The answer depends upon the comparative static changes he can observe, and upon his purposes. If the analyst only has data for a federal bureau which receives no lump-sum or matching grants, carefully specifying his model of bureaucracy is pointless, since the only comparative static tool he has – changes in cost – displays similar effects in both kinds of bureaus. If, on the other hand, the analyst is explicitly interested in determining whether bureaus are budget- or slack-maximizing, he should try to obtain data on bureaus receiving lump-sum and/or matching grants, be-

cause at present that is the only empirical way to distinguish between these two types of organizations.

The question of the observable differences between these two kinds of bureaucracies is further complicated by the ability of the sponsor to use "monitoring devices" to offset the information advantage of the bureau. As pointed out by Breton and Wintrobe (1975), in the real world the sponsor can employ techniques like strict accounting and budgeting controls, inspections of the bureau's facilities, public hearings on the bureau's performance, and the use of "watchdog" organizations like GAO, CBO, and (at the local level) professional city managers. These monitoring devices, by offsetting to some extent the information advantage of the bureau, result in a hybrid situation, between the competitive and bureaucratic extremes.

The presence of such monitoring devices might seem to obviate the need for the theoretical models developed above, models which are based on complete domination of the budget process by the bureaucrat. Even in this situation, however, it is extremely important to detail the characteristics of the bureaucratic extremes in order to identify the separate strands which make up the intermediate cases. The traits of the bureaucratic extremes are likely to remain, in muted form, when monitoring devices are incorporated into the model. For example, in a recent paper I noted that estimates of demand for local public goods that are generated from surveys of voters' preferences indicate a very low price elasticity and minimal impact of lump-sum aid on spending. If monitoring creates a situation in between the bureaucratic and competitive extremes, then, we ought to observe elasticities of demand from studies of actual spending data which are *not* greater than one in absolute value, but which *are* larger than the survey estimates. Similarly, the effect of lump-sum aid on expenditure might not be as large as in the bureaucratic models, but it ought to be larger than estimated by surveys of voter attitudes. The empirical work in Wyckoff (1988b) confirms that these are exactly what we observe in studies of local education expenditures.

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