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NONMARKET DECISION MAKING

THE PECULIAR ECONOMICS OF BUREAUCRACY

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I. *Introduction*

Economics does not now provide a theory of the maximizing bureaucrat. The currently dominant approach to public administration is to provide the organizational structure, information system, and analysis to bureaucrats who, for whatever reason, want to be efficient. This approach, however, does not develop, or explicitly recognize as relevant, the conditions for which the personal objectives of the bureaucrat are consistent with the efficiency of the bureaucracy.

At present, with a large and increasing proportion of economic activity being conducted in bureaus, economists have made no substantial contribution to answering the following questions: What are the distinguishing characteristics of bureaucracies? What are the critical elements of a theory of bureaucracy? Specifically, what do bureaucrats maximize and under what external conditions? What are the consequences of maximizing behavior under these conditions? For example, what is the equilibrium output and budget of a bureau for given demand and cost conditions? What are the effects of changes in demand and cost conditions? What are the welfare consequences of bureaucratic organization of economic activity? What changes in organization and the structure of rewards would improve the efficiency of a bureaucracy? This paper presents a simple model of the maximizing bureaucrat and, based on this model, a set of tentative qualitative answers to these questions.

II. *The Model*

The model outlined in this section is based on the following two critical characteristics of bureaus: (1) Bureaucrats maximize the total budget of their bureau, given demand and cost conditions, subject to the constraint that the budget must be equal to or greater than the minimum total costs at the equilibrium output. (2) Bureaus exchange a specific output (or combination of outputs) for a specific budget. For this paper, thus, bureaus are defined by these two characteristics.

Among the several variables that may enter the bureaucrat's utility function are the following: salary, perquisites of the office, public reputation, power, patronage, ease of managing the bureau, and ease of mak-

ing changes. All of these variables, I contend, are a positive monotonic function of the total budget of the bureau.¹ Budget maximization should be an adequate proxy even for those bureaucrats with a relatively low pecuniary motivation and a relatively high motivation for making changes in the public interest. It is an interesting observation that the most distinguished public servants of recent years have substantially increased the budgets of the bureaus for which they are responsible.

The second characteristic—bureaus exchange their output for a total budget rather than at a per unit rate—is generally recognized, but the implications of this characteristic for the behavior of a bureau are not. This characteristic gives the bureau the same type of “market” power as a monopoly that presents the market with an all-or-nothing choice.² A bureau, thus, can appropriate all of the consumer surplus. As is shown later, however, this characteristic leads to significantly different output, budget, and welfare conditions for a bureau than for a monopoly.³

The equilibrium conditions for a bureau, as defined by these two characteristics, are developed below by considering a bureau faced by linear demand and cost conditions. First, consider a bureau that buys factors in a competitive market and for which

$$V = a - bQ$$

and

$$C = c + 2dQ,$$

where

V = marginal value to consumers

C = minimum marginal cost to bureau

and

Q = output of bureau.

For these conditions, then,

$$B = aQ - \frac{b}{2} Q^2$$

¹ This paper develops only the static model of a bureau and does not explore the time dimension of budget maximization.

² I am indebted to Gordon Tullock for this powerful insight.

³ This characteristic applies strictly to a “pure” bureau, such as the Department of Defense. Many economic institutions such as the Post Office, most colleges and universities, and most hospitals sell part of their output at a per unit rate and a substantial proportion of their output for a budget.

⁴ The marginal cost function for a bureau that is not a discriminating monopsonist includes the factor surplus. The average cost function to this bureau and the corresponding marginal cost functions for a monopoly or bureau which is a discriminating monopsonist would be $C = c + dQ$.

and

$$TC = cQ + dQ^2,$$

where

$B \equiv$ total budget of bureau

and

$TC \equiv$ minimum total cost to bureau.

The equilibrium level of Q , for these conditions, is determined as follows: Maximization of B leads to an upper level of $Q = a/b$. The constraint that B must be equal to or greater than TC , under some conditions, leads to a lower level of $Q = 2(a - c)/b + 2d$. These two levels of Q are equal where $a = 2bc/b - 2d$. For a bureau that buys factors in a competitive market, the equilibrium level of Q , thus, is where

$$Q \begin{cases} = \frac{2(a - c)}{b + 2d} & \text{for } a < \frac{2bc}{b - 2d} \\ = \frac{a}{b} & \text{for } a \geq \frac{2bc}{b - 2d} \end{cases}$$

Figure 1 illustrates these equilibrium levels of output for representative demand and cost conditions.

For the lower demand condition represented by V_1 , the equilibrium output of a bureau will be in the budget-constrained region where the area of the polygon ea_1hi is equal to the area of the rectangle $efgi$. At the equilibrium level of output, there is no "fat" in this bureau; the total budget just covers the minimum total costs, and no cost-effectiveness analysis will reveal any wasted resources. The output of this bureau, however, is higher than the Pareto-optimal level. The equilibrium level of output is in a region where the minimum achievable marginal costs ig are substantially higher than the marginal value to consumers ih , offsetting all of the consumer surplus that would be generated by efficient operation at lower budget levels. If minimum marginal costs increase with output as a consequence of increasing per-unit factor costs (rather than diminishing productivity), this bureau will generate a substantial factor surplus equal to the triangle cfg —larger than would be generated at the lower, Pareto-optimal output. Legislatures predominantly representing factor interests understandably prefer the provision of public services through bureaus.

For the higher demand conditions represented by V_2 , the equilibrium output of a bureau will be in the demand-constrained region where the marginal value of output is zero. In this case the total budget will be

demand and cost conditions. Table 1 presents the equilibrium levels of output and related variables for a private monopoly which buys factors on a competitive market, a private monopoly which discriminates among factor suppliers, a competitive industry, a bureau which buys factors on a competitive market, and a bureau that discriminates among factor suppliers. Each form of organization faces the same following demand and cost conditions:

$$V = 200 - 1.00 Q$$

$$C = 75 + .25 Q.^5$$

TABLE 1
EQUILIBRIUM CONDITIONS FOR ALTERNATIVE FORMS OF ECONOMIC
ORGANIZATION FACING SAME DEMAND AND COST CONDITIONS

Product Market	Monopoly		Competitive	Bureau	
Factor Market	Competitive	Monopsony	Competitive	Competitive	Monopsony
Measures					
Output.....	50	55.6	100	166.7	200
Revenue:					
Total.....	7,500	8,024.7	10,000	19,444.4	20,000
Average.....	150	144.4	100	116.7	100.0
Marginal.....	100	88.9	100	33.3	0
Costs:					
Total.....	4,375	4,552.5	10,000	19,444.4	20,000
Average.....	87.5	81.9	100	116.7	100.0
Marginal.....	100.0	88.9	100	158.3	125.0
Profits.....	3,125	3,472.2	0	0	0
Consumer surplus..	1,250	1,543.3	5,000	0	0
Factor surplus.....	312.5	0	1,250	3,472.2	0

The traditional concern about private monopolies is that they produce too little output. Operating in an output region where marginal value is greater than marginal cost, they do not generate as much surplus value as would a competitive industry. For the demand and cost conditions shown in Table 1, a private monopoly would generate a sum of profit plus consumer and factor surplus around 75 percent that of a competitive industry.

For these demand and cost conditions, a bureau that buys factors on a competitive market will have an equilibrium output around two-thirds more than the competitive industry. This bureau will generate no profits or consumer surplus but will generate a factor surplus around 55 percent of the total surplus from a competitive industry. For these conditions,

⁵ This is the average cost function to a monopoly or bureau that is not a discriminating monopolist, the marginal cost function to a discriminating monopsonist, and the supply function to a competitive industry.

a bureau that discriminates among factor suppliers will have an equilibrium output twice that of a competitive industry and will generate no profits or surplus value.

A comparison of the supply and cost conditions is also helpful. A monopoly has no supply function; it will set an output such that marginal revenue equals marginal cost, with the output sold at a uniform price. A bureau also has no supply function; it will exchange increments of output at the demand price for each increment to an output level such that the budget equals the minimum achievable costs or the marginal value of the increment is zero. In a sense, a bureau also has no separate marginal cost function. The incremental resource withdrawal for a budget-maximizing bureau will be equal to the demand value, as the difference between this value and the minimum incremental cost will be financed from the consumer surplus appropriated at lower output levels. Only if a bureau is efficient at lower output levels, for whatever reason, would the incremental resource withdrawal be equal to the minimum incremental cost. One implication of this condition is that an analyst may not be able to identify a demand-constrained bureau's minimum cost function from budget and output behavior. All this may yield is the bureau's estimate of its demand function; in the static case, all bureaus will appear to have declining marginal costs and in a sense they do. An estimate of a demand-constrained bureau's minimum marginal cost function must be constructed from detailed estimates of the production function and factor costs—creating an extraordinary demand for analysis.

For different reasons, in summary, both private monopolies and bureaus operate in output regions that are inherently nonoptimal. The substitution of a bureau for a monopoly to provide some product or service, however, solves no problems; this substitution will reduce the aggregate surplus value and serve only the interests of the owners of specific factors.

IV. Effects of Changes in Demand and Cost Conditions

The model outlined in Section II may also be used to estimate a bureau's response to changes in demand and cost conditions.

Demand Shifts. Figure 2 illustrates the changes in a bureau's equilibrium output and budget, for given cost conditions, in response to shifts in demand.

In the budget-constrained output region, the output of a bureau will grow by more than the amount of a demand shift, even when faced by increasing marginal costs. A bureau producing an output at constant marginal costs will grow at twice the rate of a competitive industry under the same conditions. In this region, the budget per unit output

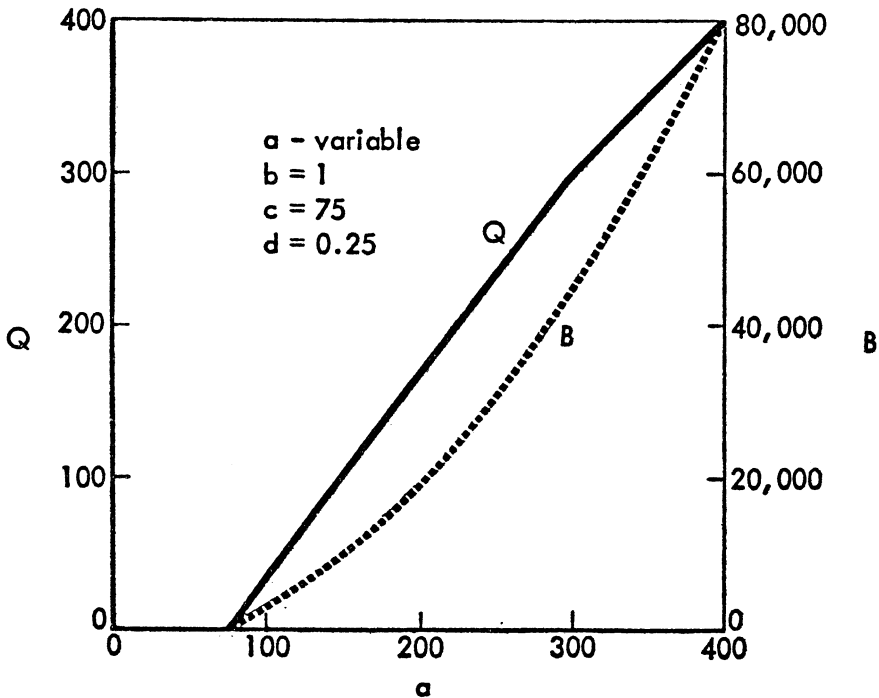


FIGURE 2
EFFECTS OF DEMAND SHIFT

will increase only by the amount of the increase in the minimum unit costs.

In the demand-constrained output region, the output of a bureau will grow by the same amount as the demand shift, regardless of the slope of the minimum marginal cost function. The slower rate of growth of a bureau in this region is still higher than the rate of growth of a competitive industry facing increasing marginal costs. In this region, the budget per unit output increases rapidly, by an amount proportionate to the demand shift, regardless of the slope of the minimum marginal cost function.

A bureau, like a private monopoly, will often find it rewarding to try to shift its demand function. The incremental budget that would result from a demand shift will be particularly high in the demand-constrained output region. One would expect, therefore, that bureaucrats would spend a significant part of their time on various promotional activities, supported by the owners of specific factors.

Changes in the Demand Slope. Figure 3 illustrates the changes in a

bureau's equilibrium output and budget, for given cost conditions, in response to changes in the slope of the demand function. The indicated changes in the intercept and slope are such that the output of a competitive industry, given the same cost conditions, would be constant at a level of 100 for each combination.

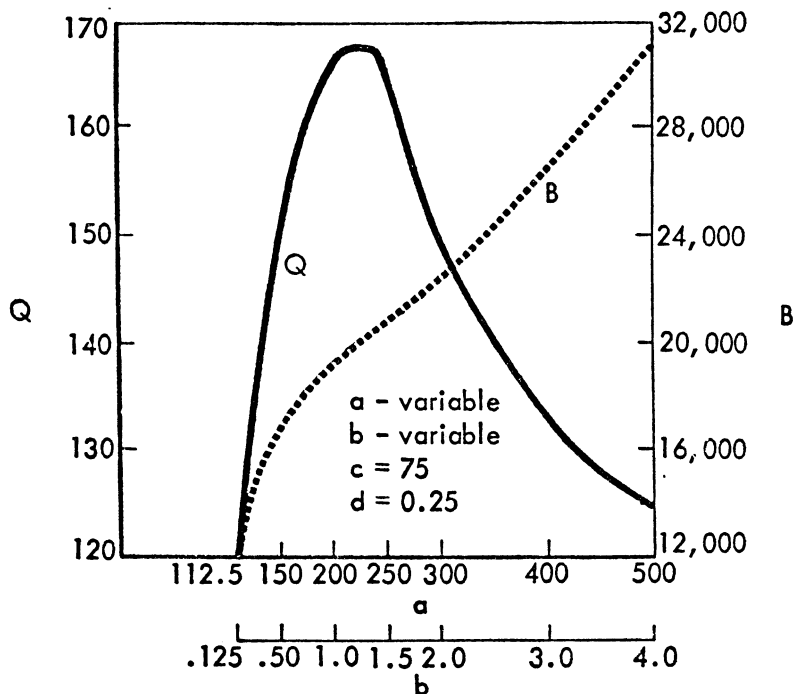


FIGURE 3
EFFECTS OF CHANGES IN THE DEMAND SLOPE

In the budget-constrained output region, the equilibrium output of a bureau will increase with increasing (negative) demand slopes; in the demand-constrained region, output will decline with increasing demand slopes. A bureau faced by a nearly horizontal demand function will produce an output at a budget per unit output only slightly higher than that of a competitive industry, but the total budget and the budget per unit output will increase monotonically with higher demand slopes. This suggests that a bureau may find it rewarding to try to increase the slope of the demand function for its output by promotional activities citing public "need" or military "requirement" to be fulfilled regardless of cost. A more important suggestion is that a bureau operating in a highly competitive output market would be relatively efficient. However, the present environment of bureaucracy—with severe constraints

on the creation of new bureaus or new outputs by existing bureaus, and the passion of reformers to consolidate bureaus with similar output—seems diabolically designed to reduce the competition among bureaus and increase the inefficiency (and, not incidentally, the budget) of the bureaucracy.

Cost Shifts. Figure 4 illustrates the changes in a bureau's equilibrium output and budget, for given demand conditions, in response to shifts in the minimum marginal cost function.

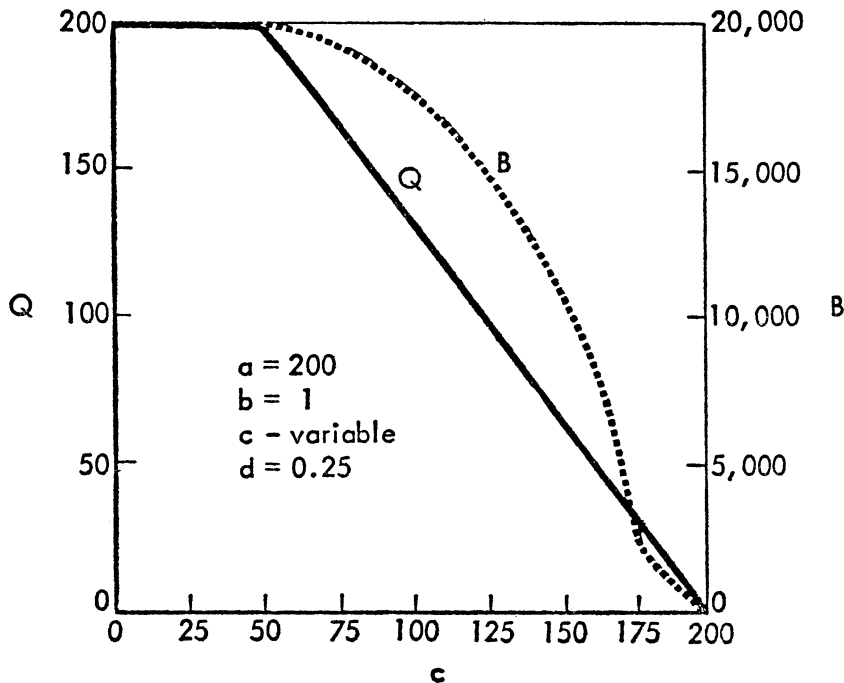


FIGURE 4
EFFECTS OF COST SHIFTS

In the budget-constrained output region, a downward shift of the minimum marginal cost function will increase the equilibrium output of a bureau at a rapid rate. A bureau producing an output at constant minimum marginal cost will grow at twice the rate of a competitive industry for the same downward cost shift. The bureau's budget will grow rapidly with the initial cost reductions and then very slowly as output approaches the demand-constrained output level. In the higher output region, further reductions in cost will not increase either the equilibrium output or budget.

These effects suggest that new bureaus or those facing exogenous

increases in costs will be very cost conscious. Such bureaus will have an incentive to determine their minimum marginal cost function and to try to reduce the level of this function. Older bureaus or those facing a rapid increase in demand couldn't care less on either count. Tullock has been intrigued by the observation that bureaus both attempt to reduce costs and manifestly waste huge amounts of resources. This model

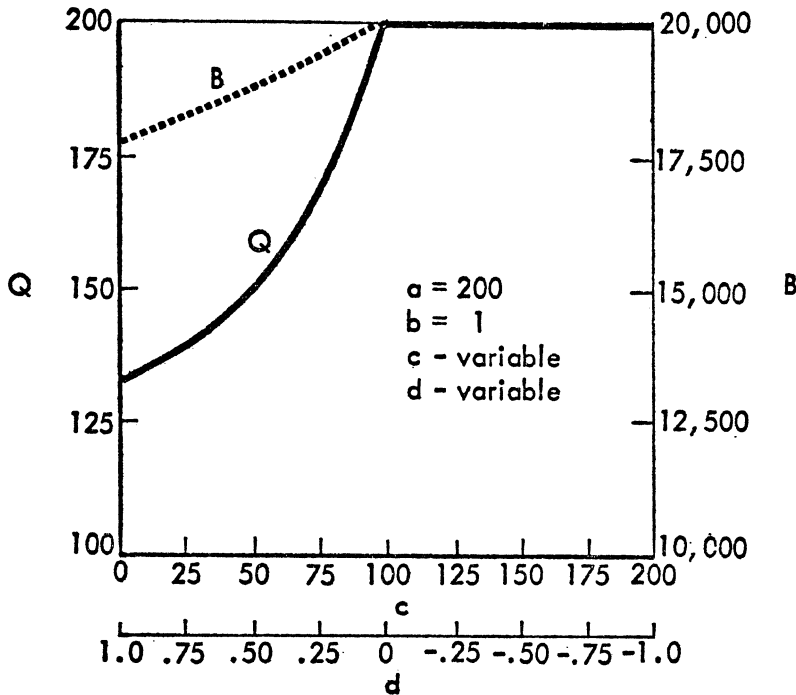


FIGURE 5
EFFECTS OF CHANGES IN THE COST SLOPE

suggests that, in equilibrium, a single-product bureau will be in one or the other of these conditions. A multiproduct bureau, such as Department of Defense, should be expected to attempt to reduce costs on the budget-constrained outputs and to assure that costs are sufficiently high to exhaust the obtainable budget on the demand-constrained outputs.

Changes in the Slope of the Minimum Unit Cost Function. Figure 5 illustrates the changes in a bureau's equilibrium output and budget, for given demand conditions, in response to changes in the slope of the minimum marginal cost function. The indicated changes in the intercept and slope are such that the output of a competitive industry, given the

same demand conditions, would be constant at a level of 100 for each combination.

In the budget constrained output region, the equilibrium output of a bureau that buys factors on a competitive market will increase with a reduction of the slope of the minimum unit cost function to a level, with constant unit costs, that is twice the output of a competitive industry. The bureau's budget will also increase with a reduction in the slope of this function, but relatively slowly. Both output and budget are invariant to changes in the slope of the cost function in the demand-constrained output region.

These effects suggest that bureaus may have an incentive to use production processes with a higher cost at low output levels and a lower cost at high output levels. In the static case, however, this incentive is not very strong and may be offset in part by pressure through the legislature from the owners of specific factors.

V. Critical Tests of This Model

This model suggests an image of a bureau with a level and rate of growth of output that is up to twice that of a competitive industry facing the same conditions. Demand by consumers may be the basis for establishing a bureau, but the interests of this group in preserving the bureau will diminish or disappear as the bureau creates no consumer surplus, except by negligence. A bureau, however, creates a substantially larger factor surplus than would a competitive industry, and the primary interests in continuing the bureau (or a war) are likely to originate from the bureau itself and the owners of specific factors. In the demand-constrained output region, a bureau's only concern about costs is to assure that they exhaust the obtainable budget. A bureau should be expected to engage in considerable promotion, in cooperation with the owners of specific factors, to augment the demand for its output, and to reduce—through persuasion, restrictions on entry, and consolidation—the elasticity of this demand.

These are serious charges. A set of critical tests of these assertions are difficult to pose. The best tests that I can conceive are to compare the output and costs of a bureau with those of a private firm with the same type of product. A comparison of the Social Security Administration and insurance companies, public and private hospitals, public and private statistics gathering organizations, or public and private police and garbage disposal services may be sufficient. Such tests, however, will be difficult as the existence of potential competition may present the bureau with a highly elastic demand, and some of the private firms producing a similar product have some of the characteristics of bureaus. A test of these assertions about a bureau that is the sole producer of a

set of products, such as the Department of Defense, is even more difficult and probably more important. For such bureaus, an internal comparison at different points of time or, possibly, with bureaus producing a similar product in another political jurisdiction could be made.

VI. *Further Implications for Analysis and Policy*

Analytic Developments. The static model of a single-product bureau outlined in Section II should be extended in several dimensions. First, the consequences of the time-dimension of budget maximization should be developed. Louis DeAlessi's preliminary analysis suggests that a bureaucrat's concept of his property rights will lead to a preference for capital-intensive production processes. Second, the behavior of a multi-product bureau that receives a single budget (or several budgets not specific to product type) should be explored. And third, the behavior of "mixed" bureaus, such as the Post Office, educational institutions, and public hospitals should be explored.

Policy Implications. This model of a bureau, if the suggested tests fail to disconfirm its assertions, has important implications for the organization for the production of the large and increasing proportion of our national output now produced by bureaus. What changes could be made to improve the efficiency of the production of these goods and services?

First, and probably most interesting, bureaucratic provision of these goods and services could be maintained, but each bureau would operate in a competitive environment and face a highly elastic demand function. The creation of new bureaus would be encouraged. Existing bureaus would be permitted and encouraged to produce products now provided by other bureaus. "Antitrust" restrictions would prevent collusive behavior to divide products or output among bureaus and to prevent the dominance of one bureau in a single product. The legislature would be willing to shift some part of the output of one agency to another, based on output and budget performance. The resulting bureaucracy would consist of many single and multiproduct bureaus without any obvious relation (in use) of the products offered by any single bureau. (As such, it would look a little like the corporate sector of our economy.)

Second, the incentives of bureaucrats could be changed to encourage them to minimize the budget for a given output or set of outputs. For example, the salaries of the top 5 percent of the personnel of a bureau could be a negative function of the budget of a bureau for a given set of outputs. This would still permit a political determination of the output level for the combination of bureaus providing the same product. Such a system would require more precise measurement of output than now, but would not require the monetary valuation of this output.

Such a system may also attract better managers to the bureaucracy.

Third, the type of goods and services now provided by bureaus could be financed through government or foundations as is now the case, but the provision of these services would be contracted to private, profit-seeking economic institutions. The bureaucracy, as such, would disappear, except for the review and contracting agencies. This system would also require better measures of output than now, but better measures are necessary for improved efficiency under any organizational form.