

Budget-maximizing governmental agencies: An empirical test

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Abstract

Niskanen's theory of government budgeting, involving powerful agencies interested in maximizing their budgets through bargaining with a weak, poorly informed governmental 'Sponsor', has received wide recognition. This paper presents the first direct empirical tests of Niskanen's ideas. One implication of Niskanen's model of budgeting is that the demand for public services will *appear* to be elastic. Niskanen's model also implies restrictions on the elasticity of the derived demand for labor in the public sector. Neither set of predictions is supported by existing empirical research on government activity.

1. Introduction

A traditional concern in public finance has been that the public sector would fail to allocate goods and services efficiently because of difficulties in *articulation of demand*.¹ Recently, recognition has spread that another perhaps more important source of trouble could be found on the *supply side* of the public sector (broadly defined to include the agencies and bureaus charged with carrying out the policies of the chief executive and legislature). Government bureaucrats may not simply be 'public servants' but may threaten social welfare by possession and exercise of independent power over public resources.

Closely associated with this line of thinking is Niskanen (1971), who proposed the specific hypothesis that governmental agencies seek to maximize the budgets they receive from the 'Sponsor', Niskanen's name for the parts of government (the legislature and chief executive) that 'demand' services. Niskanen further proposed that because of informational advantages about the programs they run, agencies possess overwhelming bargaining power in relation to the Sponsor. Thus even if the demand articulation problem were fully solved, Niskanen's powerful, self-interested agencies

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would produce too great a quantity of output and poorly serve the public interest.

Niskanen's work has largely shared the fate of the numerous 'alternative theories of the firm' in the literature on market organization. Like Baumol's (1959) early work on sales-maximization, Niskanen's ideas have spawned a host of theoretical papers refining and modifying his theory.² But because of the lack of convincing empirical tests to assess the importance of alternative relative to more traditional theories, Niskanen's budget-maximization hypothesis seems to have had limited impact on policy. In a review of the empirical literature related to bureaucratic supply, Niskanen (1975: 624) himself admits that, 'No available study, to my knowledge, directly addresses the oversupply hypothesis.'³

The purpose of this short paper is to present a test of Niskanen's theory that governmental agencies maximize budgets. It turns out that one implication of Niskanen's model is that, if agencies maximize their budgets, the demand for public services will always *appear* to be elastic. The reason for this is presented in Section 2. Section 3 checks this prediction against the evidence on the elasticity of demand for public services. Implications of Niskanen's theory for derived demand for inputs into public service production are also explored. Conclusions and possible directions for further research are discussed in Section 4.

2. Budget-maximization and the apparent elasticity of demand for public services

Niskanen's basic theory can be presented quite simply. The governmental Sponsor has a demand or marginal benefit schedule for the public service in question shown as AB in Figure 1.⁴ Cost of the public services is OC per unit. The efficient output is quantity OH , where marginal cost equals marginal benefit. The 'naive' or traditional model of bureaucratic supply would predict that the Sponsor would exert its statutory authority and direct the passive agency to produce quantity OH for total budget $OCDH$.

In Niskanen's model, the Sponsor and agency are in a bargaining relationship. The exchange is unequal, however, because the Sponsor does not know the agency's cost, but the agency knows the Sponsor's preferences. Due to its informational advantage the agency is in a position to make the equivalent of an all-or-nothing offer to the Sponsor of an output/budget combination that maximizes the budget of the agency subject to leaving the Sponsor no worse off than with no public output at all. The equilibrium output of the agency in this setting is quantity OG and budget $OCEG$.⁵ The agency effectively expands output to the point where the Sponsor enjoys no surplus from the agency's activity.⁶ Since at the zero surplus output for the

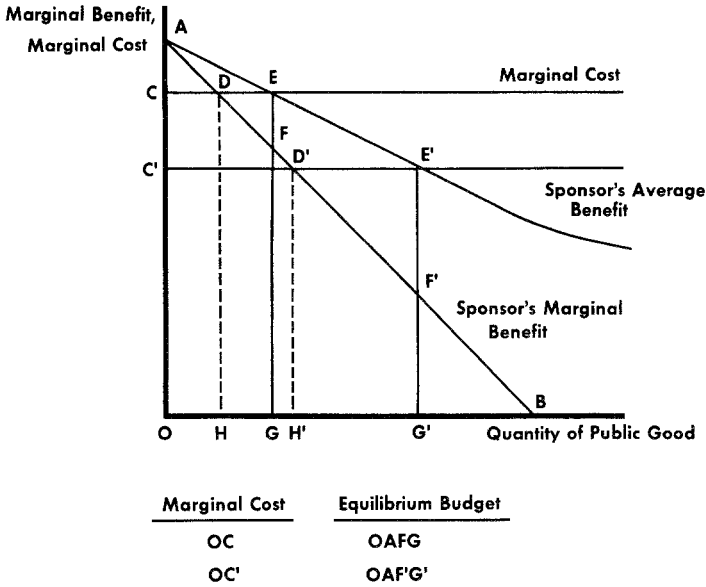


Figure 1. Niskanen budgetary equilibrium

Sponsor, area ACD in Figure 1 equals DEF , the agencies budget is described by either area $OCEG$ (total cost) or $OAFG$ (total benefit).

Consider now a reduction in the cost of public services produced by the agency to OC' . The marginal benefit curve AB may be elastic or inelastic. If budgetary equilibria were determined by setting marginal cost equal to marginal benefit, theory would imply no restrictions on observed elasticity of demand. Total budget may rise or fall with a decrease in price. But things are different when budgetary equilibria are where total benefit equals total cost. When cost falls to OC' , the new output will be OG' with budget $OC'E'G'$ or $OAF'G'$. Since quantity increases with a decrease in cost, and since budget is always equal to total benefit of the quantity produced, *total budget unambiguously rises with a decrease in cost of output*. The percentage increase in quantity 'purchased' exceeds the percentage fall in unit cost. Demand always *appears* to be elastic.

Another way to show this is to note that equilibria in this model are at the point of intersection of the average benefit curve AEE' and average cost curve, and that the average benefit curve is always elastic. If $B(Q)$ is total benefit, average benefit is $B(Q)/Q$. The elasticity of $B(Q)/Q$ is $B(Q)/B'(Q)Q - B(Q)$ which is always less than -1 when marginal benefit, $B'(Q)$, is falling.

Thus if budgets are set by forces described in Niskanen's model, demand for services will appear to be elastic. This implication can be checked against the evidence.

3. Evidence on the elasticity of demand for public services

State and local governments are laboratories for research into demand for public services. Growth of Federal matching grants since the Second World War has generated interest in how recipient governments respond to the reduced price of services. Recent interest in employment policies in the public sector provides another avenue of research into how governments respond to a change in a major component of their cost.⁷

Table 1 summarizes the results of three studies of the effect of state and Federal grants on the demand for state and local public services. Bergstrom and Goodman (1973) and Mushkin (1972) studied municipalities, and Borchering and Deacon (1972) studied states. An estimated coefficient less than minus one indicates an elastic demand. The three studies report 19 estimates of demand elasticities (including the estimates in parentheses from the Borchering-Deacon study and those reported as 'elastic' or 'inelastic' from Mushkin). Only six coefficient estimates are less than -1 . Twelve estimates are between 0 and -1 , indicating an inelastic demand. One coefficient is positive but insignificantly different from zero. These data are certainly not consistent with a uniformly elastic apparent demand for public services, and are therefore not consistent with Niskanen's hypothesis that public agencies maximize budgets.⁸

Niskanen's model of budgetary equilibrium has implications for the elasticity of demand for inputs into the production of public services. The most important input for public services is labor. In simple two-factor production function with constant returns to scale, the relationship between the elasticity of final demand and the elasticity of demand for labor is (see the appendix):

$$\epsilon_L = s \epsilon_Q - (1 - s) \sigma$$

where

- ϵ_L = wage elasticity of derived demand for labor
- s = share of labor in total cost
- ϵ_Q = price elasticity of demand for final output
- σ = elasticity of substitution of capital and labor in production

Niskanen's theory predicts that $\epsilon_Q < -1$, implying

Table 1. Estimates of own-price elasticity of demand from conditional grants

| Service | Bergstrom-Goodman ^a | Borcherding-Deacon ^b | Mushkin |
|----------------------|--------------------------------|---------------------------------|-----------|
| General expenditures | -0.23* | | |
| Police | -0.25* | -0.97* | |
| Fire | | -0.35* | inelastic |
| Health | | -1.12* | inelastic |
| Sanitation-sewers | | -0.86 (-3.25) | inelastic |
| Highways | | 0.59 (-0.18) | |
| Local education | | -1.13* (-1.22*) | elastic |
| Park-recreation | - .09* | -0.50 (-0.18) | elastic |

* indicates significance at the 5% level.

^a These are results from pooled regressions on 826 municipalities for 10 states. Bergstrom and Goodman estimated separate regressions for each state but the elasticity estimates were unaffected.

^b For some services Borcherding and Deacon estimated separate regressions for two groups of states, groups determined by estimates of the technology of production in states. Where Borcherding and Deacon ran separate regressions, we report two estimates. These estimates are from equations including organization and size as independent variables.

$$\frac{\epsilon_L + (1 - s)\sigma}{s} < -1$$

or,

$$\epsilon_L < -s - (1 - s)\sigma$$

s is between 0 and 1 and σ is non-negative.

The share of labor in costs of state and local governments ranged from 40-50% from 1960 to 1970. Assuming even a relatively low value for σ , say .5, would mean that the elasticity of demand for labor would have to be less than $-.75$ to be consistent with Niskanen's model.

Table 2 summarizes results from Ehrenberg's (1973) study of demand for state and local government employees using data from all states for the period 1958 to 1969. Ehrenberg found the demand for government employees to be uniformly inelastic.⁹ Only one in Ehrenberg's eleven categories was demand more elastic than $-.75$. Bahl et al. (1978) studied police employment and also found the demand to be inelastic at $-.320$.

Table 2. Ehrenberg's wage-elasticities of demand for public employment

| Service | Wage elasticity |
|-------------------|-----------------|
| Education | - 0.43* |
| Highway | - 0.59* |
| Public welfare | - 1.00* |
| Hospital | - 0.41* |
| Health | - 0.28* |
| Police | - 0.28* |
| Fire | - 0.28* |
| Sanitation | - 0.50* |
| Natural resources | - 0.53* |
| General control | - 0.32* |
| All other | 0.07 |

* indicates significance at 5% level

4. Concluding remarks

Behavior of state and local governments in response to changes in the cost of producing their services is inconsistent with Niskanen's model of supply by government agencies. The budget-maximizing agency in a powerful bargaining relation to the Sponsor will always increase budget more than proportionately in response to a fall in cost. Evidence on the elasticity of apparent demand for public services does not reflect this effect. Niskanen's model is also inconsistent with existing research on demand for public employment.

A number of explanations are possible. Most obviously, Niskanen's hypothesis could be incorrect — at either one of its crucial parts. First of all, agency bureaucrats might not be interested in maximizing their budget. Even if they were in a strong bargaining position in relation to the Sponsor they might not in general exert their power. The second possibility is that even if bureaucrats were indeed interested in maximizing their budget, the bargaining power of the agency in relation to the governmental Sponsor might be so weak that the 'motives' of the bureaucrats would be irrelevant.¹⁰

The evidence reviewed here does not of course prove Niskanen wrong. Budget-maximizing agencies may be tending to make demand appear elastic, but this effect may be swamped by other special forces at work in the budgetary process tending to make demand appear to be inelastic.¹¹ It would be plausible, for instance, to build-in various rigidities along the line of Ehrenberg's (1973) work with a model of incremental budgeting to

account for the sluggishness in changes in output in response to cost changes.¹² Empirical models of budget determination incorporating partial adjustment to equilibrium in a period may lead to estimated long-run demand elasticities more consistent with Niskanen's model.

The most favorable setting for testing Niskanen's ideas is probably the Federal government. State and local government 'Sponsors', because of their heavy involvement in the budgetary process and the more manageable size of their government, may be considerably more educated with respect to the production function of their agencies than is the federal 'Sponsor' – the President and Congress.¹³ The creation of budgetary watchdog agencies by the Federal Sponsor, the Office of Management and Budget and the Congressional Budget Office, testifies to the difficulty Federal elected officials have in coming to grips with the working of the supply side of the Federal government. Research on demand for Federally produced goods and services might reveal the high absolute elasticities of demand consistent with Niskanen's hypothesis.

Appendix

Assume public services are produced according to the production function (1) with constant returns to scale

$$Q = F(K, L) \tag{1}$$

where

- Q = output
- K = capital inputs
- L = labor inputs

Additional definitions are:

- l = L/Q
- k = K/Q
- p = price of final output
- w = wage of labor
- r = rental rate on capital
- s = wL/pQ (labor's share)
- ϵ_Q = price elasticity of demand for final output
- ϵ_L = wage elasticity of derived demand for labor
- σ = elasticity of substitution of capital and labor in production

When the wage of labor changes, labor demanded changes for two reasons: input substitution at a given output, and changes in demand for the final product as a result of output price changes. These two effects are easily separated by writing the quantity of labor used as:

$$L = lQ \quad (2)$$

The elasticity of derived demand for labor can be expressed as:

$$\epsilon_L = \frac{\partial l/l}{\partial w/w} + \epsilon_Q \frac{\partial p/p}{\partial w/w} \quad (3)$$

With CRS, $pQ = wL + rK$, so $\partial p/\partial w = l$. And since $wl/p = s$,

$$\frac{\partial p/p}{\partial w/w} = s \quad (4)$$

The first term in (3) can be expressed in terms of the elasticity of substitution between labor and capital and labor's share in costs. Using the first-order condition for cost minimization that the ratio of marginal products is equal to the ratio of factor prices,

$$\frac{\partial(k/l)}{\partial l} = \frac{-l w/r - k}{l^2} \quad (5)$$

Rearranging, dividing both sides by k/l and substituting for labor's share we have

$$\frac{\partial l}{l} = -(1-s) \partial(k/l)/(k/l) \quad (6)$$

Applying the definition of elasticity of substitution, and substituting (6) and (4) into (3):

$$\epsilon_L = s \epsilon_Q - (1-s)\sigma$$

NOTES

1. The literature is extensive and well-known. Some of the classics are Wicksell (1896), Lindahl (1919), Samuelson (1954), Downs (1957), and Buchanan and Tullock (1962).
2. Migue and Belanger (1974), Tullock (1974), Breton and Wintrobe (1975), Niskanen (1975), McGuire, Coiner and Spancake (1979). See Orzechowski (1977) for a review of some of these theories.
3. Orzechowski's (1977) survey also contains no direct test of the budget maximization hypothesis.
4. Niskanen calls this simply a demand curve, but strictly it is the compensated demand curve evaluated at the utility level of no output of the public service. The

- area under this compensated demand or marginal benefit schedule up to any quantity is the total willingness to pay of the Sponsor for that quantity.
5. Budget maximization by the agency constrained by the Sponsor's demand implies that the agency would be productively efficient.
 6. This pessimistic welfare result is the consequence of the 'partial equilibrium' framework, regarding only a single public output, adopted by Niskanen. In a 'general equilibrium', where agencies producing different (but substitutable) products are permitted to compete for the Sponsor's funds, the Sponsor enjoys positive net surplus in budgetary equilibrium. See McGuire, Coiner and Spancake (1979).
 7. Federal matching grants and employee wages are obviously known to the Sponsor as well as to the agency. This does not mean, however, the Sponsor cannot be ignorant of the production function for public outputs. It is this ignorance that places the Sponsor at a disadvantage in relation to the agency.
 8. Perkins (1977) has made another study of the elasticity of demand for local public services. His small sample, 30 communities in Massachusetts, hampered precise estimation of elasticity coefficients. For only three of his ten service categories, however, was demand estimated to be elastic.
 9. These results are from Ehrenberg's 'equilibrium' model of public employment. He also estimated equations for a lagged adjustment model based on incremental budgeting. Implied long-run wage elasticities for this model were also all greater than -1 .
 10. This corresponds in the market organization context to the result that in a competitive environment, the sales-maximizing firm behaves 'as if' it maximizes profits.
 11. If there is an unobserved influence on demand for public services inversely related to federal aid formulas, i.e., low demand and high levels of aid associated beyond controls in expenditure studies, demand will tend to appear to be inelastic when it is not.
 12. But as we noted above in note 9, the long-run wage elasticities of public employment were inelastic in Ehrenberg's incremental budgeting model.
 13. Borcharding, Bush and Spann (1977) have plausibly suggested that citizens have less incentive to monitor the productive activity of their government as the population size of a governmental unit grows. Elected officials of large units may have similarly reduced incentives.

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