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Developing a test of economic theories of bureaucracy through the use of an experimental approach

Walker, James D., Ph.D.

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U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

DEVELOPING A TEST OF ECONOMIC THEORIES OF BUREAUCRACY THROUGH THE USE OF AN EXPERIMENTAL APPROACH

by

James D. Walker

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January 11, 1995
Date

Harold M. Hochman
Chair of Examining Committee

January 11, 1995
Date

Michael Grossman
Executive Officer

Harold M. Hochman, Chair
Michael Grossman
Salih Neftci

Supervisory Committee

ABSTRACT

DEVELOPING A TEST OF ECONOMIC THEORIES OF BUREAUCRACY THROUGH THE USE OF AN EXPERIMENTAL APPROACH

by

James D. Walker

Adviser: Professor Harold M. Hochman

Economic theories of bureaucracy do not lend themselves well to traditional methods of empirical analysis. In particular, evaluating the preferences of the bureaucrat is difficult when studying budget allocations. Yet preferences are important to these theories.

The purpose of this thesis is to develop and test a method revealing preferences and testing them against theories of bureaucracy. Applying game theory and theories of experimental economics, a 'Budget Game' is constructed and applied through a survey experiment. The results will provide data to test the theories. Subjects will be drawn from a public transportation agency. The results will determine the effectiveness of using this method in surveying other agencies.

The approach of the thesis is as follows: First, a model of a public agency is developed to discuss the various nonproductive expenditures and how preferences relate to expenditures. Next, three theories of bureaucracy from Economics, Sociology, and Political Science are discussed and analyzed from an economic perspective. In particular, these theories will clarify the preferences of bureaucrats, developing a common framework for comparison. Then principles of game theory are applied to developing the *game form* necessary to design and execute the experiment. This stage

will establish the theoretical validity and allow an examination of the similarities and differences in the theories discussed. Finally, an experiment based on the 'Budget Game' will be developed and executed to test the model and the theories of bureaucracy.

The use of laboratory experiments in economics has grown considerably in recent years. Tests of supply and demand, public choice, and other aspects of economic theory have yielded insights into behavior and provided less 'noisy' data. It is hoped that among the outcomes of this research will be a better method of understanding the nature of bureaucracy and a contribution to an improved understanding of both the benefits and limitations of experimental analysis in economics.

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1. INTRODUCTION

Conceivably, the major contribution of Public Choice theory to public economics is the idea of a political marketplace or "politics as exchange" (Buchanan, 1987). Agents are seen as utility-maximizing, and self-interest, given the constraints imposed by the system, leads to the demand and supply of publicly provided goods. The supply of publicly provided goods is determined in great part by the utility functions of the providers, especially bureaucrats. Thus the preferences of bureaucrats can be an important factor in the political marketplace.

From Max Weber's view of bureaucracy to William Niskanen's contradictory view, theories of bureaucracy and the empirical evidence supporting these theories have stated basic behavioral hypotheses about the bureaucrat. These hypotheses have not been fully explored in the empirical literature, only the resulting expenditure evidence. This leads to conclusions that government grows or is large because bureaucrats desire it or because they appropriate rents. When their preferences diverge from those of their sponsors or constituents, principal-agent problems develop. Weber's optimistic view of the bureaucrat as an efficient manager has been replaced by Niskanen's that the bureaucrat is an inefficient manager.

There are two problems associated with testing preference hypotheses in theories of bureaucracy. First, hypotheses about bureaucratic preferences are not developed consistently. That is, hypotheses from the various schools of thought are not stated in terms of similar constructs, such as a utility function connected to the output or

expenditures of the bureau. Therefore, it is hard to compare and evaluate these hypotheses. Second, traditional methods of data collection do not provide an adequate means to test hypotheses. Experimental methods offer alternatives to traditional data gathering. The purpose of this monograph is to address these two problems. By reviewing and comparing preferences of bureaucrats described various theories, a set of potential responses can be developed and tested. However, we face the problem of the truthful revelation of preferences. Game theory allows us to develop response functions, relationships between preferences and truthful responses, so the approach will use a game-theoretic format by creating a *budget game*. Then an experiment will be designed to generate responses according to the constraints imposed by the theories and the response functions.

The first step is to develop a model of a bureau. Bureaus are similar to firms in that they produce a good or service. However they differ from the neoclassical representation of the firm in two respects: profit-maximization is not their objective and price and demand may not be directly related; political considerations may play a stronger role. In spite of this, bureaus hire labor and capital and operate in a firm-like fashion. As in the Coasean view of the firm (Coase, 1937), bureaus replace market transactions with contractual and hierarchial arrangements. Administration also plays a more important role in the bureau, as it does with most major corporations where owners and managers differ. Thus behavioral theories of the firm can be applied, covering issues such as principal-agent problems.

Once the model of the bureau is developed, three theories of bureaucracy are analyzed: an economic theory developed essentially by Niskanen (1971, 1975) along with the criticisms of Migué and Bélanger (1974) and Breton and Wintrobe (1975); a political science view represented by Patrick Dunleavy (1983); and a sociological view as represented by Marshall Meyer (1985), in which the birth and growth of bureaucracy are considered important. This analysis will result in the derivation of consistent utility functions which can then be tested.

Because the test of theories of bureaucracy will be derived from an experimental analysis, utilizing budget choices, it is important to establish a *budget game*. Using the principles of game theory, the game will be constructed from the model; and, given the theories of bureaucracy developed, response strategies will be discussed for the chosen theories. These strategies will allow us to see the differences in the theories and assure the theoretical validity of the experimental studies conducted.

Finally, the experiment to be designed will be consistent with the theories of experimental economics, a growing area of Economics. This experiment will be used to gather data and test the theories of bureaucracy analyzed. Recent work by economists at the University of Turin will provide guidelines, including experimental results, for developing experiments which survey agencies in the United States. Ultimately, the experiments will test the response of municipal public administrators in areas such as public transportation, medical services, and the arts.

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2. MODELING A BUREAU

Overview

To examine the nature of bureaucratic behavior and theories of bureaucracy, we must first develop a model of a bureau that is rich enough to deal with both theory and reality. That is our purpose in this chapter. A bureau is a public agency or nonprofit organization that is usually created to provide a publicly provided good, such as mass transportation, welfare services, etc. Bureaucrats are managers of these organizations. Niskanen assumed that only the bureau head was a bureaucrat, but the other theories treat lower ranked managers as bureaucrats as well. As managers, they can make budget-allocation decisions based upon their preferences restricted by the rules established and the ability of the bureau or the governing authority to monitor their behavior. In this sense, bureaucracy refers to a bureau's organizational behavior and the principal-agent problems that can arise. These problems are similar to the separation of ownership and management within a firm.

Bureaucracy has been studied extensively in public administration, political science, and sociology. Max Weber's classic essay on bureaucracy developed some of the main characteristics of bureaucracy and viewed bureaucracy as an efficient form of organization (Weber, 1946). He attributed the growth of the bureaucratic form of organization to its technological superiority over other forms. Bureaucrats were professionals committed to their *vocations*. There were clear sets of rules and hierarchies governing the operation of the bureau and the conduct of the bureaucrat. Weber saw this

as a natural development of modern society and viewed it favorably.

Von Mises (1944) took a contrary view. He concluded that bureaucracy was essentially inefficient and that bureaucrats sought to further their ends to the detriment of the public. Von Mises equated bureaucracy with communism, seeing the growth of bureaucracy as a threat to democratic society and a market economy.

Downs (1967) took more of a middle view. He saw bureaus as necessary institutions because of the externalities that give rise to market failures and collective decisions. Yet he shared the view that bureaucrats were rational, self-interested individuals who sought to meet their private objectives. Downs clarified the organization of a bureau and the objectives of bureaucrats. He also generalized the concept of a bureau by relating it to the concept of *bureaucratic-decisionmaking*. Downs' analysis along with Tullock (1965) and others set the stage for a more formal economic treatment of bureaucracy, first developed by Niskanen.

Downs (1967, 25-26) demonstrated that the bureau is structured in a similar fashion to a firm. Indeed, it is generally agreed that bureaucracy exists in private organizations as well as public. Yet few theoretical treatments of a bureau develop a model similar to the neoclassical firm, incorporating a cost function to show the allocation of funds to the various factors involved in the production of the good or service. This is an important part of our analysis because it is the efficient allocation of resources that is at the heart of an economic theory of bureaucracy and the testing of various theories of bureaucracy. Essential to this efficiency is the creation of incentives.

Simon explains that all types of organizations, whether profit-making, nonprofit, or bureaucratic organizations, face the problem of "inducing employees to work toward the organizational goals." (Simon, 1991, 28). Profit maximization is an effective incentive for owners of profit-making firms, but as Scitovsky (1943) has noted, it requires a certain *psychology*. Bureaucratic organizations are inherently nonprofit and thus have different organizational goals. Bureaucrats, operating within a utility-maximizing framework, can behave contrary to the organizational goals unless constrained or given the proper incentives. Because these constraints and incentives require the allocation of resources (monitoring costs, compensation structure), the model's structure should specify them. Explicit specification is also important when developing a game-theoretic approach to bureaucracy and the experiment to be conducted.

The similarity between the bureau and the firm implies a correspondence between theories of the firm and theories of bureaucracy. Cyert and Hedrick (1972) include Newhouse's (1970) analysis of a nonprofit hospital in their analysis of the firm, frequently used as an example of bureaucracy and overproduction. Newhouse demonstrated that when profit-maximization is not a goal, other goals replace it. In the case of non-profit hospitals, quantity and quality of services become the goals of choice, constrained by the maximum deficit. Cyert and Hedrick use Newhouse to support the behavioral theory of the firm. In both the behavioral theory of the firm and the economic theory of bureaucracy as represented by those such as Niskanen, the preferences of the manager (or bureaucrat) are important.

The next section will analyze the structure of a bureau. Then we will examine the major theories of bureaucracy and administrative behavior. This will provide us with the foundation for developing a *bureaucracy game* and deriving responses associated with these theories.

The Structure of a Bureau

A bureau or agency is a non-market institution. It does not offer services to a market in return for revenues (the budget). Instead, it is a captive of the principal organization or decision-maker—the politician when government is the principal organization.[1] For example, the bureau does not offer a quantity of the service and the principal offer a budget. Nor does the bureau sell its services for a budget and allow the principal to accept or reject the budget. Instead, the bureau enters into a bargaining game with the principal whereby the costs of the service are estimated (a budget proposal) and negotiations take place on the final form of the budget. The principal may reject the initial proposal, but revisions will take place and be reviewed until a final budget is approved.

Finally, a bureau is a hierarchial institution in which resources are allocated by a bureaucrat for various reasons, only one of which is cost. These reasons may be preferences or constraints or both.

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[1] Niskanen (1971, 24) views the relationship as one of the political authority being the captive of the bureau. However, the political authority can respond to a change in the political environment by eliminating the bureau, while the opposite is not true. The political authority is thus dependent upon the bureau to gain favor from the voters.

The bureaucrat is the key player in this form of organization. He is considered to have the expertise to administer and translate the goals of the principal into the actions and strategies of the bureau. He is in no way an entrepreneur, his conduct and preferences being guided by factors other than the profitability of the organization. For Weber, the bureaucrat was a noble being, taking sound management principles and creating a more efficient organization. For Niskanen, the bureaucrat is a self-serving being, making decisions that benefit his self-interest, which is defined in terms of income, perquisites and prestige, rather than the interests of the principal.

Bureaus are the common institutional form for governmental supply, so understanding the process of organization and output from a bureaucratic framework is necessary to understand the allocation of resources in government. Public choice theorists view this process within a supply and demand framework (Niskanen is a perfect example). However, the bargaining process and the indirect relationship between the suppliers of the publicly provided goods and ultimate demanders limit the comparison to a supply and demand model. Margolis (1975) criticizes Niskanen's approach by noting that the value of the good may be something other than what the individual is willing to pay. This is particularly true with public goods (or private goods with a high degree of publicness).[2] Market failure can exist.

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[2] A public good is one in which one person's consumption does not prevent another from consuming the same good. A common example is national defense where person A's protection from defense services does not prevent person B from being protected by the same services. With a private good, such as a hamburger, if person A eats the hamburger, person B cannot. Private goods can have a degree of publicness when externalities exist.

In addition, budgets tend to follow an incremental process, growing (or shrinking) from the current budget. Maintaining, expanding, or reducing the supply of a publicly provided good is usually the major goal of the bureau and is based upon an evaluation of voter preferences, made separately from the budgetary process itself. While agencies may evaluate their services in comparison to the 'market,' the commitment of the agency to public provision and the budgetary process is made first, then the budget is developed. This cannot be a supply and demand process similar to a market.

The bureaucratic form, given the conditions discussed above, tends to be hierarchical in nature. The public agency receives instructions from the political authority and executes those instructions. The political process is seen as a means of determining the value of the publicly provided good. Once this value is determined, the appropriate instructions are given to the agency. Spillover costs and benefits are better accounted for within this process. The bureaucrat will tend to look up at the political authority rather than out at the 'marketplace,' whereas the entrepreneur does the opposite. The creation of the budget reflects this approach.

Table 2.1 shows the makeup of a typical budget. This budget is drawn from a local transportation agency. Revenue estimates are provided, and expenditures are forecast. The expenditures are categorized by function and major spending groups (personnel, equipment, etc.) so that the principals can see the trends of the various categories. Explanations of the forecasts are provided with topics discussed, such as expected inflation and changes in health insurance coverage.

Table 2.1
A Sample Budget

	1992 Budget	1992 Year-End Forecast	1993 Budget	1994 Forecast	1995 Forecast	1992 Forecast vs 1992 Budget Inc/(Dec)
REVENUE						
Passenger	226,346	230,413	234,477	238,718	243,626	4,067
Rents & Conc.	11,176	12,718	11,877	12,340	12,864	1,542
Term. Utilities	5,627	5,217	5,222	3,551	787	(410)
Bar Car	3,580	3,451	3,573	3,712	3,870	(129)
Miscellaneous	1,712	1,607	629	653	681	(105)
TOTAL REVENUE	248,441	253,406	255,778	258,974	261,828	4,965
EXPENSES						
Administration						
President	2,523	2,012	2,596	2,734	2,870	(511)
Legal	3,714	3,547	3,995	4,189	4,388	(167)
Risk Management	32,530	27,028	29,138	30,625	32,159	(5,502)
Planning	6,143	6,166	6,778	7,399	7,742	23
Finance & Admin	36,945	34,395	36,722	39,443	44,171	(2,550)
Human Resources	9,265	8,954	9,941	10,783	11,295	(311)
Capital Programs	2,035	1,872	8,266	20,712	14,111	(163)
Corporate	(17,253)	(11,105)	(17,851)	(17,443)	(17,697)	6,147
SUBTOTAL ADMIN.	75,902	72,868	79,585	98,442	99,039	(3,034)
Operations						
VP Operations	9,312	7,822	7,691	8,116	8,358	(1,490)
Terminal	25,386	25,763	25,404	25,361	23,734	377
Station Services	14,074	13,953	14,175	15,122	15,631	(121)
Police	12,796	12,149	12,966	13,638	14,347	(647)
Transportation	111,439	114,678	118,203	124,763	133,394	3,239
Equipment Maint.	108,280	101,931	106,118	113,714	131,340	(6,349)
Maint. of Way	89,016	88,326	93,922	99,385	103,490	(690)
SUBTOTAL OPERATIONS	370,303	364,622	378,479	400,099	430,294	(5,681)
TOTAL UNADJ. EXPENSES	446,205	437,490	458,064	498,541	529,333	(8,715)
Depreciation	63,444	63,444	69,408	74,000	77,000	0
TOTAL EXPENSES	509,649	500,934	527,472	572,541	606,333	(8,715)
OPERATING DEFICIT	(261,208)	(247,528)	(271,694)	(313,567)	(344,505)	13,680
WEST SUBSIDY	(5,673)	(5,356)	(5,874)	(6,364)	(6,895)	317
TOTAL DEFICIT	(266,881)	(252,884)	(277,568)	(319,931)	(351,400)	13,997

There is a principal-agent relationship between the political authority and the bureaucrat. The political authority authorizes the expenditures proposed by the bureau. The bureaucrat seeks to structure the budget to maximize his preferences given the constraints imposed by the nature of the budget and the preferences of the political authority. It is the ultimate purpose of the bureau to produce a good, Q. To demonstrate how the various budgetary items relate to the output of the bureau, we will apply a Constant Elasticity of Substitution (C.E.S.) production function to be specified as

$$(2.1) \qquad Q = [a_1X_1^{\theta} + a_2X_2^{\theta} + a_3X_3^{\theta} + a_4X_4^{\theta}]^{1/\theta}$$

where $a_1 + a_2 + a_3 + a_4 = 1$. The inputs are four goods specified as

$$(2.2a) \qquad X_1 = L_1^{\lambda}K_1^{1-\lambda} \qquad 0 \leq \lambda \leq 1$$

$$(2.2b) \qquad X_2 = L_2^{\rho}K_2^{1-\rho} \qquad 0 \leq \rho \leq 1$$

$$(2.2c) \qquad X_3 = K_3^{\gamma} \qquad 0 \leq \gamma \leq 1$$

$$(2.2d) \qquad X_4 = K_4^{\sigma} \qquad 0 \leq \sigma \leq 1$$

X_1 represents the operational input, the production function of the operational part of the production process. X_2, X_3, and X_4 are administrative inputs to be discussed more below.

The C.E.S. production is commonly used to explain the relationship of a firm's output to more than two inputs. This makes the C.E.S. production useful in our analysis of a bureau since we seek to discuss specific categories of inputs and their output effects. Because some inputs are more productive than others, we will categorize them into three groups. For example, financial planning and analysis would be considered to have a higher share in the production of Q than say attendance at a professional conference or

a large office for the top administrator. Thus we will assume $a_3 = a_4 < a_2 < a_1$. In addition $K = K_1 + K_2 + K_3 + K_4$ and is fixed at each period. Goods X_3 and X_4 use only capital in their production. The reasoning is that X_3 is a good designed to affect the performance of the administrator L_2. Perquisites would fall within X_3, so its purpose is to connect the expenditures on perquisites and indirect professional activities to the output of the good. Monitoring costs would fall within X_4. Because γ and σ are less than one, there are declining returns to scale, whereas the other inputs are assumed to display constant returns to scale.

Associated with this production function is a cost function specified as

$$C(W, Q) = W_1L_1 + W_2L_2 + RK. \tag{2.3}$$

where W is a vector of the associated unit costs. The output of Q depends upon the operational and administrative inputs which are hired by the bureau. The minimum cost of Q, noted as $C_m(W_m, Q)$ is defined as

DEFINITION 2.1. Given an output, Q, a cost function is a minimum cost $C_m(W_m, Q)$ when

$$C_m(W_m, Q) < C(W, Q), \quad \forall C, \ Q > 0.$$

In a firm, the minimization of cost, given prices, quantity demanded, and output, leads to profit maximization. However, the non-profit constraint of the bureau will lead to a different allocation of resources, first by producing a different Q, usually a larger amount. The bureau has no need for normal profits (a cost of production in a

competitive firm), and therefore it has a lower cost of production and can produce more Q. Second, it produces administrative services designed to minimize corruption, insure equitable distribution, or execute legal mandates. Marshall Meyer discusses the "diamond principle" in which every transaction is recorded by two people and reconciled by a third (1985, 65). This method was used to prevent a misappropriation of funds in municipal agencies, but can add to the cost of output. Many complaints about the provision of goods by public agencies center around the fact that the cost is higher than what it would cost the private sector to produce the same output. However, the private sector may not incur the spillover costs associated with private provision while the public agency was created in part to incur these costs. As a result, the cost function of a public agency may be higher than the minimum cost as faced by a private firm. The public agency, internalizing external costs, improves the allocation of resources, creating economic benefits that would not otherwise exist.

When compared to a profit-making firm under perfect competition, these spillover costs may lead to a non-minimum cost function. Uncertainty over the true costs, potential rent-seeking, and inefficient rules may make these costs higher than they should otherwise be. This is because the administrative functions that we included in the production of output display declining marginal productivity. The industrial organization literature refers to this as managerial diseconomies (Scherer and Ross, 1990, p. 104). As organizations grow, the ability of the bureaucrat to manage becomes increasingly difficult. The benefits of internalizing the spillover costs from private provision can be offset by the managerial diseconomies of public provision. Input X_3 captures this effect.

Unfortunately, the costs associated with managerial diseconomies are more easily seen than the benefits received from public provision, which explains in part why bureaus are seen as inefficient.

There are two agents in this model, the political authority (A) and the bureaucrat (B). Their preferences are specified as

(2.4) $$U^a = U^a(\mathbb{R}^a)$$

and

(2.5) $$U^b = U^b(\mathbb{R}^b)$$

where $\mathbb{R}^a$ and $\mathbb{R}^b$ are vectors of preference elements, the components of the agents' utility (reelection, salary, prestige, etc). The preferences can include quantity and cost minimization for the political authority and compensation and perquisites for the bureaucrat. The theories of bureaucracy analyzed below will provide the preference elements for these vectors.

Because a bureau has no profit motive, it faces a particular constraint.[3] This constraint is specified as

(2.6) $$B = C(W, Q), \qquad \forall Q,$$

where B is the total budget funds approved by the political authority. This implies that

(2.7) $$B/Q = C(W, Q)/Q), \qquad \forall Q.$$

Since the total budget is allocated to total cost at every Q, average budget (unit cost) is

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[3] Nonprofit organizations also face the same constraint as bureaus, and it has been noted elsewhere that there are similarities with bureaus. Weisbrod (1988, Ch. 3) discusses the incentive problems in nonprofit organizations that are similar to those that arise in bureaucracy.

equal to average cost at all levels of Q. This does not mean that $C(W, Q)$ is the minimum cost of producing a Q, only that the choice of B made by the political authority is intended to finance the proposed expenditures, current and future. This point must be clarified. The perfectly competitive firm tends in the long-run toward zero economic profits and earns only normal profits as a cost of doing business. Bureaus *intend* to make zero normal profits. A bureau may receive funds in excess of its costs, but due only to factors that lead to a desired current surplus, such as a fund for future building or other planned expenditure. Therefore, like the perfectly competitive firm, the bureau tends toward normal profits by design. Of course one of the problems facing the political authority is to choose a B which equals the minimum cost, $C_m(W, Q)$, for a given quantity. Thus an equilibrium can be defined.

DEFINITION 2.2. An *equilibrium* is a set $\{B^*, Q^*, \text{and } C^*(W^*, Q^*)\}$ where

a) the constraints (2.1), (2.2), and (2.5) are satisfied.

b) the choice of B^*, Q^*, and $C^*(Q^*)$ solve the maximization problems of the political authority and the bureaucrat, and

c) $B^* = C^*(W^*, Q^*)$.

The economic problem of the political authority is essentially one of choosing a budget based upon the proposed costs provided by the bureaucrat. His decisions will be based upon his preferences and the information problems associated with the establishment of the budget and its proper execution.

There will be two areas in which their preferences coincide. First, the output of the bureau will be important to both. Both will prefer to produce an output, but at some point one will probably desire to produce more output while the other will desire less, *ceteris paribus*. In other words, for a given wage, the political authority would want maximum effort and the bureaucrat minimum effort. Second, costs of output will affect their utility functions differently. For a given output, the political authority will desire lower costs while the bureaucrat desires higher costs, such as higher salaries and more perquisites[4] The allocation of resources among the various production processes will be determined by the bureaucrat's preferences, but these may be contrary to the preferences of the political authority. This is especiallv true, for example, when constraints on direct compensation exist. The bureaucrat would then, e.g., want to attend more professional conferences at the bureau's expense, whereas the political authority would see this as a waste of money.

Hierarchy

The neoclassical model of the firm assumes that both the demand for the output of the firm and it inputs are purchased in markets. Bureaus are specific examples where this is not the case.

There are no entrepreneurs to make these decisions, but bureaucrats who are given the right to make allocation decisions by the political authority. The assigning of

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[4] Since all theories of bureaucracy discussed assume rational bureaucrats, it can be safely assumed that if the bureaucrat can choose one aspect of cost, his salary, he would choose the highest possible sustainable salary.

these rights is complemented by the constraints imposed by the political authority, in order to minimize the risks associated with assigning these rights. Essentially, we will discuss in detail the rights allocated to the bureaucrat, the constraints imposed, and their relationships to the degree of uncertainty over the costs of producing output Q.

Bureaus are hierarchical structures in which decisions regarding the hiring and allocation of resources are given to the bureaucrat. This is similar to any firm that has separate administrative functions performed by professional administrators. For the firm, the owners provide entitlements to make these decisions to the managers, who in turn delegate responsibility to subordinates. Thus while Citibank is owned by stockholders, a loan officer in Queens has the right to commit funds to a loan. For a bureau, the political authority gives entitlements to the bureaucrat. Both are constrained by rules of conduct, but otherwise they may allocate resources as they see fit.

The bureau is established when the political authority seeks to replace market activity (at least to a degree) with hierarchical authority. As mentioned above, the spillover costs associated with markets for some goods leads to a desire to internalize them. Public provision is intended to provide a means to internalize spillover costs. However, political authority is incapable of 'micro-management,' so agency relations are established and bureaus are formed. As Coase (1937) noted, there are cost advantages to internalizing and establishing hierarchical organizations rather than organizing via purely market transactions.

In our model, the political authority enters into a bargaining game with the bureaucrat to establish and approve a budget for producing the bureau's output. Implicit

in the agreement is the assignment of the right to allocate resources according to the judgment of the bureaucrat. The political authority, relinquishing its right to decide on the allocation of resources, instead negotiates with the bureaucrat to minimize the cost of output. This cost not only includes the direct costs, but also the costs of monitoring the bureaucrat's behavior. Thus there is no guarantee that the cost function provided by the bureaucrat is the minimum cost function when compared to a purely competitive firm.[5] Giving the bureaucrat the right to institute a hierarchical organization also gives the bureaucrat the ability to choose a non-minimum cost function. The ability of the bureaucrat to deviate from minimum cost will be determined by the cost of monitoring behavior. Thus the bureaucrat does not have to choose cost-minimizing inputs.

The bureaucrat will be hired at a certain level with the expectation of promotion and salary increases inherent in his acceptance of the position. A career bureaucrat (as with any worker in a major company) will view his career path in terms of both his performance and the opportunity for advancement. There will also be a tendency to socialize himself to the norms of the organization. Sociological and Political Science theories of bureaucracy have taken these views in contrast to the Economic theories, particularly the Public Choice theories represented by Niskanen. Niskanen sees direct allocation of resources as having a direct effect on the utility of the bureaucrat through income or perquisites, constrained only by the monitoring costs incurred by the political authority. Others such as Dunleavy (1985) and Meyer (1985) view the objectives of the

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[5] Niskanen (1971, 1975) develops his model on the basis that the bureau operates with a cost function similar to the purely competitive firm, with no spillover effects internalized, such as through monitoring costs.

bureaucrat in terms of their *bureau-shaping* or their *demand for control.* Meyer noted that bureaus and *rational administration* were seen as ways to control public funds and reduce corruption in municipal services. The bureaucrat is a professional who may value his or her profession and the need for public responsibility, a Weberian characterization.

With the assignment of rights to the bureaucrat, there is a decrease in control over the allocation of resources, reducing the utility of the political authority (as representative of the public), the *Principal-Agent Problem.* The rights given to the bureaucrat mean that some control over the allocation of resources is relinquished. This can increase efficiency since the ability of the bureaucrat to respond more quickly is enhanced, but it also means that the bureaucrat can choose allocations contrary to the objectives of the political authority, by opening the possibility of rent-seeking. The political authority can establish controls to minimize rent-seeking, but the resources devoted to control functions may also reduce the productivity of the bureau. Jensen and Meckling (1976, 325) call these *bonding costs* and Breton and Wintrobe (1975) refer to them as *control devices.* Jensen and Meckling note how these costs would result in a firm not being run in a value-maximizing manner, but are an unavoidable result of the agency relationship. The political authority, sensitive to the need to maintain honesty and integrity, will favor controls on the bureau. Because they deal with *public funds*, more care and control over spending must take place. However, imposing these costs on the bureau would add to X_3, raising costs above their minimum level.

The bureaucrat's constraints are included in the contracting relationship and the imposition of monitoring functions X_4. These constraints may have an initial impact of

reducing costs or improving productivity, but as they increase, their marginal productivity declines. As Jensen and Meckling (1976, 310) discussed, the firm (and the bureau) are *legal fictions, "which serve as a nexus for a set of contracting relationships among individuals"* (their italics). Included in this process is the establishment of rules of behavior and a method of monitoring that behavior. Those costs and devices established are designed to insure proper behavior by the bureaucrats, but they do not contribute to the direct production of the output. Included in these constraints are proper procedures and requirements for reporting planned or actual expenditures, justifying the expense, limitations on the purchase of certain brands of inputs (i.e. restrictions exist in U.S. public agencies on the purchase of certain foreign goods even if they are cheaper than U.S. made goods, thus raising the cost to the agency), and social and political requirements.

The relationship between inputs X_3 and X_4 are therefore derived from the opportunity costs associated with the agency relationship. To deal with the risks inherent in expenditure rights to the bureaucrat, bonding costs are imposed. According to Jensen and Meckling (1976, 325), the political authority can have the bureaucrat agree to audits and other monitoring activities. The optimal bureau size will exist where the expected marginal cost of X_3 equals the negative of the marginal cost of X_4. The more uncertainty over the expenditures made by the bureaucrat, the higher X_4.

Summary

The model developed above is designed to capture some of the features of a real bureaucracy. The production function (2.1) and the cost function (2.3) incorporate the direct inputs to the production of the output, but also the more indirect administrative inputs. These administrative inputs are the essence of the model. They are categorized as inputs to maximize the efficiency of production, such as accounting and financial administration, subsidiary goods such as perquisites which may enhance the productivity of the administrator, and finally, control devices such as auditing functions. The political authority enters into a bargaining agreement with the bureaucrat to assign rights to allocate resources, particularly with X_2 and X_3. Since assigning these rights increases the risks associated with the principal-agent relationship, control devices are included in X_4.

In the standard analysis of the firm, it would simply be a matter of finding the optimal values associated with the objectives and constraints, but the process of reaching equilibrium is a game. Because the political authority relinquishes some control, the bureaucrat is not automatically constrained unless devices exist to constrain him. These devices are in part included in the bargaining process and in the rules of behavior associated with the control devices.

In the next chapter, we will discuss the preferences of the bureaucrat by examining theories of bureaucracy. Then we will develop a *game-form* to utilize this model and apply those theories. The above model is more realistic than those developed by Niskanen and others providing us with a guide for developing our game, identifying the inputs used by the bureau, and allowing us to design an appropriate experiment.

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3. THEORIES OF BUREAUCRACY

In Chapter 2, we developed a general model of a bureau, essentially as a `firm' that maintained zero profits. A bureau, like any firm, hires resources and, through a production function, produces the publicly provided good. Our concern here is that since the profit-maximizing *psychology* is not indigenous to the bureau, other objectives and behavioral aspects of organizations become more important. Theories of bureaucracy focus upon these objectives and behaviors.

Except for Niskanen (1971, 1975), however and some subsequent critics, most of the major theories of bureaucracy offer little more than anecdotal descriptions of the relationships between the objectives of the bureaucrat and the allocation of resources. Even Niskanen's specification is very general, allowing only that the objectives relate to the total budget. Yet *our* model of a bureau is more specific, providing categories related to both the discretionary part and the nondiscretionary part of the budget. Since the ultimate goal is to develop the means to test *real-world* decisions, it is necessary to pursue two goals: analyze theories of bureaucracy to determine similarities and differences and develop a common framework (a common functional form) for specifying bureaucratic objectives derived from the theories.

In this chapter, we will deal with three theories, developed by practitioners of three disciplines, Economics (Niskanen and critics), Sociology (Meyer) and Political Science (Dunleavy). We will compare them and note their similarities and differences, particularly in relation to the model developed in Chapter 2. Our intent will be to clarify

the preferences of bureaucrats hypothesized by these theories and consider how changes in the budget constraint will lead to reallocations based upon those preferences. This will form the basis for developing our *game* and designing the survey experiment.

Political Authority

Since our analysis will deal with bureaucratic preferences and responses, the role of the political authority in affecting the behavior of the bureaucrat, while important, can be simplified. Indeed, the game and experiment take the political authority as an exogenous factor and changes in budget constraints represent changes in the behavior of the political authority. However, it is important to specify the political authority's utility function to clarify how the equilibrium will be determined.

Recalling equation (2.4), the political authority's utility was a function of a vector, $\boldsymbol{R}^a$. Niskanen (1975, 623) discusses *vote maximizing legislators* who respond to changes in voter preferences. Voters, being rational, can be assumed to want maximum output at minimum cost. But the voter will also be reluctant to pay unlimited taxes, no matter the output. Thus rational politicians will derive their utility along the output-cost frontier. Politicians receive votes if they provide the public with the good Q, but lose votes if budgets lead to higher taxes. Thus the political authority desires to maximize Q, but will be constrained by a reluctance to impose excessive taxes caused by higher expenditures. Thus we will assume the political authority will have a utility function specified as

$$U^a = \ln(Q/B(Q)) + \ln(1/B(Q)) + \theta \tag{3.1}$$

which it maximizes, subject to the production function (2.1), the cost function (2.3), and

the other constraints described in the model of Chapter 2. θ is an exogenous scaler used to shift the political authority's preferences.

The Theories

The theories discussed are not intended to be exclusive, but they do offer a spectrum of views from the major fields interested in bureaucracy. However, our analysis is intended to deal with the economic effects, particularly the allocation of resources. Political science and sociological theories do not deal specifically with the issue of resource allocation, but for the economist, this is the essential issue. Sociology may provide the behavioral basis for bureaucratic utility functions, but if a self-interested bureaucrat behaves in the same way as an altruistic bureaucrat in terms of resource allocation, then there is no economic issue to deal with and no difference between Niskanen and Weber. Therefore, our discussion begins with the view that differences among the theories can be represented as differences in the allocation of resources. The only exception may be on the constraints imposed by the political authority which limit the discretionary behavior of the bureaucrat, a plausible contingency. The Economic theory developed by Niskanen was amended from its original form to explain political constraints. In our case, the game and the experiment, properly designed, will avoid this problem by treating the political authority as exogenous. The game will establish the constraints by our choice of survey questions and budget choices.

Our goal in this chapter is to structure the theories so that the utility functions will all have the same general form; the utility of the bureaucrat will depend in some way on

the preferences of the bureaucrat. Consider integrity. If a bureaucrat believes strongly that public funds should be spent properly, he will favor more being spent on preventing waste and fraud than would otherwise be the case. Perquisites would have low priority, but control devices would have a high priority. The corrupt bureaucrat would have the opposite desires.

Niskanen

Niskanen's theory of bureaucracy comes primarily from *Bureaucracy and Representative Government* (Niskanen, 1971). He develops the thesis that bureaucrats are budget-maximizing and since budget and output are related, they tend to be output-maximizing, producing a good or service beyond the efficient level. Adapting the views of Downs, Tullock, Weber and Von Mises, Niskanen offers an economic model of bureaucratic behavior and the preference function of the bureaucrat.

Central to Niskanen's original thesis was the assumption of a budget/output maximizing bureaucrat. A bureau offers "a promised set of activities and the expected output(s) of these activities for a budget." (1971, 24). Niskanen described a direct relationship between the bureau's budget and the bureaucrat's utility, a point he was criticized for not formally developing. For the bureaucrat, the preferences of the sponsor can be viewed from a *budget-output function* represented as:

(3.1) $\qquad B = aQ - bQ^2, \qquad\qquad 0 \leq Q \leq a/2b,$

where B is the maximum budget the sponsor is willing to grant to the bureau during a certain time period and Q is the expected level of output of the bureau. Niskanen

proceeded to derive the marginal valuation or `demand function' of the sponsor shown by

(3.2) $V = a - 2bQ, \qquad 0 \leq Q \leq a/2b$.

Once the preferences of the bureaucrat and sponsor were established, Niskanen defined a total cost function:

(3.3) $C = cQ + dQ^2, \qquad 0 \leq Q$

and thus a marginal cost function

(3.4) $MC = c + 2dQ, \qquad 0 \leq Q.$

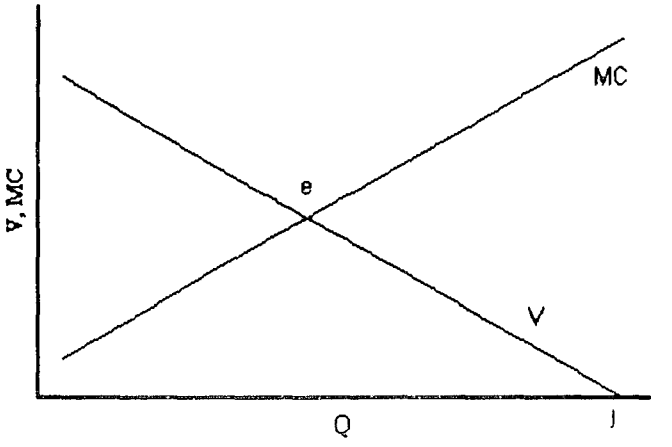
Niskanen compared the bureau's output with that of a purely competitive firm, with the budget-output function comparable to the price-output function of a demander of the output.

The bureaucrat's utility is based upon the two ideas of rationality and desire for survival. Rationality includes receiving benefits from "salary, perquisites, public reputation, power, patronage,..." along with other variables (1971, 38). All these variables require an increase in the size of the budget to be achieved. Therefore, the bureaucrat seeks to maximize these variables constrained only by the demand function of the sponsor.

Niskanen finishes his basic model with the constraint

(3.5) $B \geq TC.$

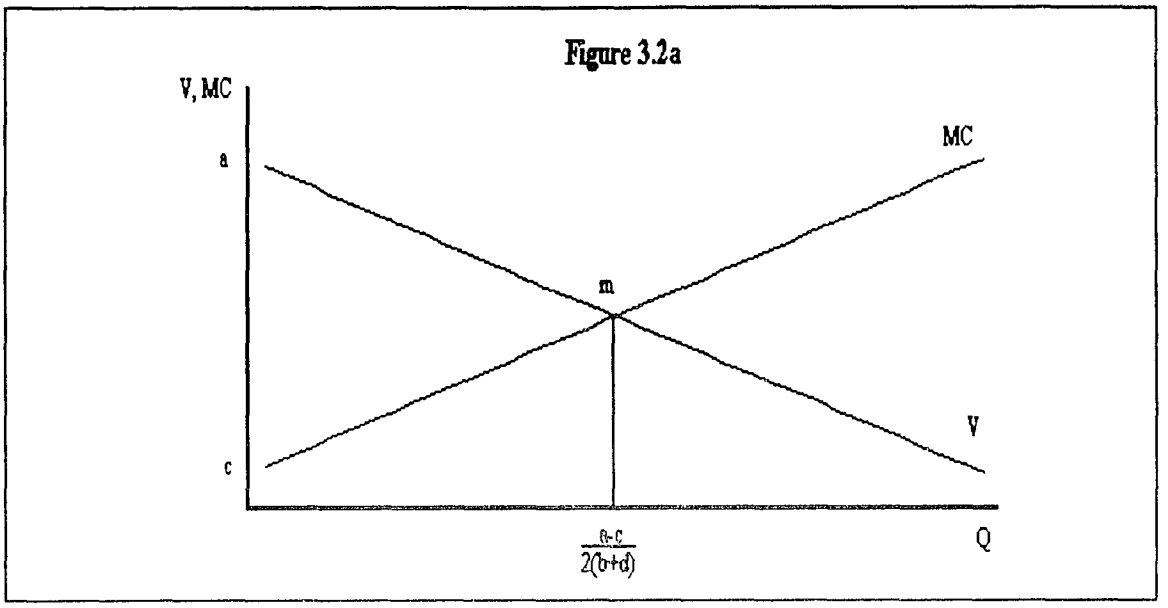
Figure 3.1



Simplifying somewhat, Niskanen describes the relationship in Figure 3.1 (1971, 47)[1]. The efficient point is at e where the marginal cost equals the marginal valuation. However, the bureaucrat will propose a budget which maximizes the approved budget subject to the constraint of equation (3.5). In a model with only a demand-constraint, that point is at *j* where the marginal valuation equals zero. Since the marginal cost exceeds the marginal value at point *j*, the bureaucrat is overproducing and budget-maximizing, compared to the (hypothetical) outcome in a competitive market.

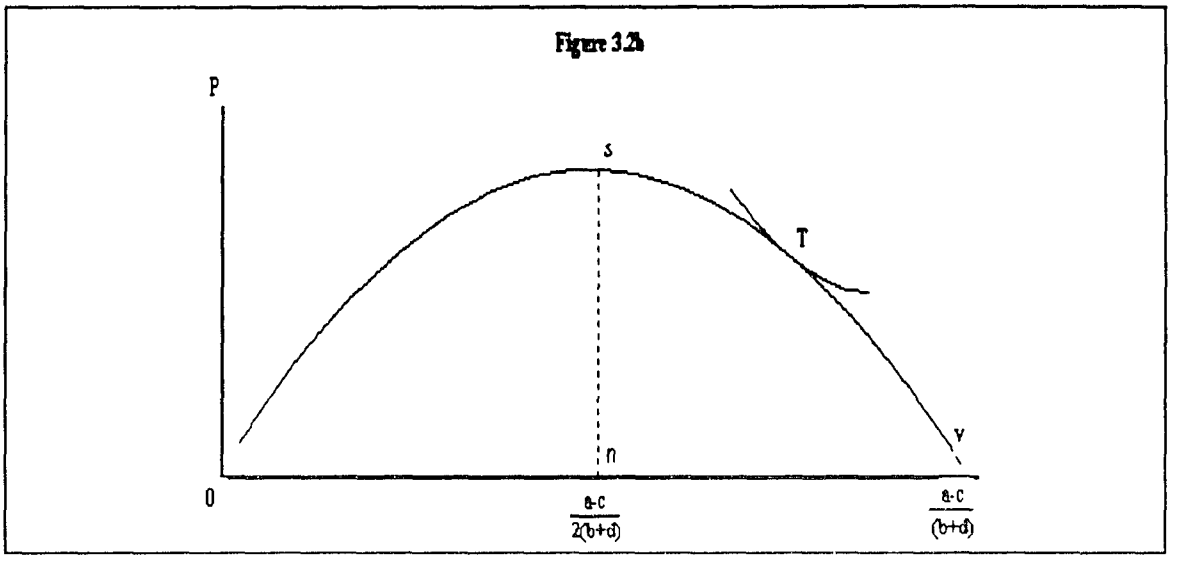
The first major criticism of Niskanen's work came from Migué and Bélanger (1974). They argued that the budgets of bureaus are always too large, but output may not be. This derives from the fact that bureaucrats can appropriate the rents in the form

[1] Niskanen originally discussed two types of marginal valuation functions, a budget constrained function (V_1) and a demand-constrained function (V_2). In the demand-constrained area, the bureaucrat will produce where the marginal valuation equals zero. Migué and Bélanger and Breton and Wintrobe, along with Niskanen's 1975 article, do not differentiate, so I shall not either.



of utility-producing expenses. From this perspective, the bureaucrat's utility is a function of that portion of the 'profits' of the bureau that can be appropriated by the bureaucrat for discretionary use. This would be the maximum attainable budget less the minimum cost.

Migué and Bélanger begin by deriving the marginal revenue and cost functions of the bureau, the marginal revenue being equated to the marginal value to the sponsor. Using Niskanen's notation, they calculate the point where marginal cost equals the marginal valuation (point m in Figure 3.2a). At this point `profits' are maximized, but since the `owners' cannot appropriate these `profits,' it is left to the manager's discretion to apply them. The manager will apply them along the budget line shown in Figure 3.2b until point *T* is reached, the bureaucrat's maximum utility. Point s represents the output of a perfectly discriminating monopoly while point *v* represents the output maximizing bureau, Niskanen's bureau.



Migué and Bélanger conclude that Niskanen's view was incomplete and that the bureaucrat will not necessarily be output-maximizing, but will produce somewhere along the budget frontier between `profit-maximizing' and output-maximizing. If the bureaucrat chose point s, output would be at its minimum feasible amount and these `profits' would be allocated to expenses that have no effect on output[2]. At the other extreme he is shifting these `profits' to output, point v, where he would operate at maximum output for the given expenditures, but would be productively inefficient.

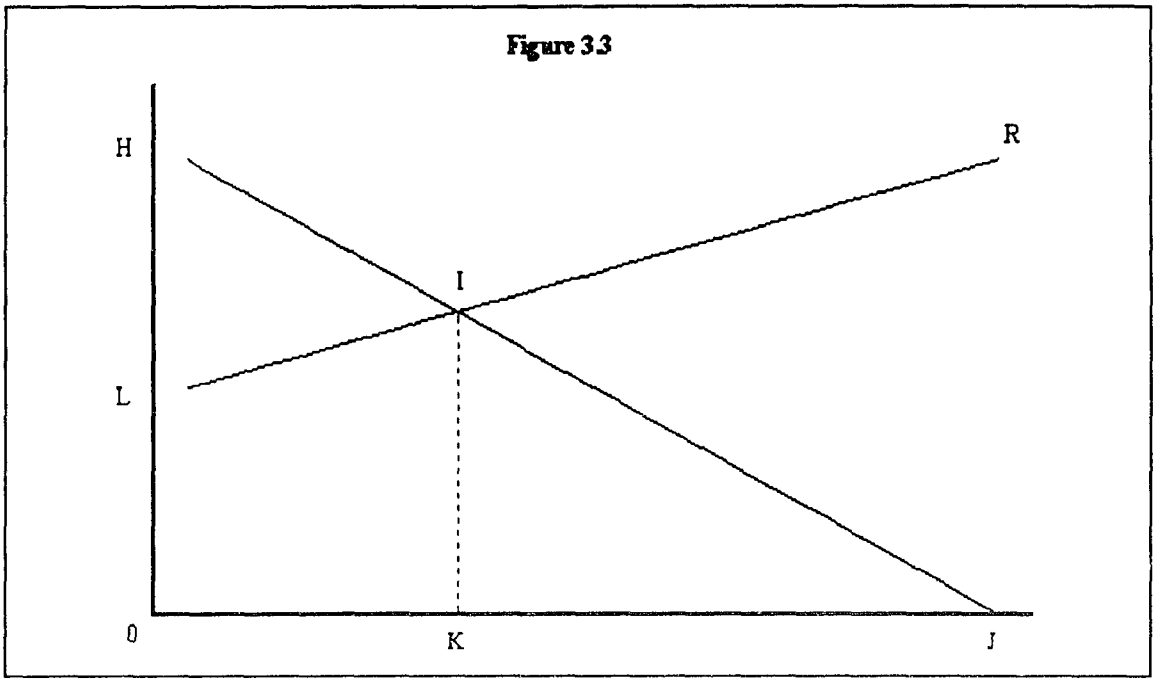
Breton and Wintobe (1975) criticized Niskanen on the grounds that the bureaucrat is not a simple monopolist who can impose his preferences on the political authority, but that politicians can impose constraints on the bureaucrat. Vote-maximizing legislators will utilize their monopsony powers to control bureaucratic excesses. Bureaucratic

[2] For a firm, point s represents profit-maximization, the optimal point. However, since the bureau is established to provide maximum output with no profit, then it must reallocate profits to increased output. The bureaucrat, however, can choose to use these 'profits' for his purposes, effectively rent-seeking.

managers will also have an incentive to limit the size of the bureau since as its size increases, managers face a loss of control as more authority must be delegated.

Breton and Wintrobe (1975, 198) discuss two conditions of a bureau: "(1) bureaucratic managers are subject to the exercise of hierarchical control and (2) the limited `power' of a public bureau over its sponsor does not stem from its position as a monopoly supplier of a service, but rather from its control of information." Individual bureaucrats are not monopolists, but depend upon the positive evaluation of the political authority for advancement. Thus the political authority can create incentives through its control of the bureaucrat's career. In addition, perfect information about the expenditures made by the bureaucrat would enable the political authority to evaluate the performance of the bureaucrat, particularly in maximizing the utility of the political authority. Moreover, institutional arrangements *must be* periodically recontracted and are, especially at the margin. Therefore, only through imperfect and asymmetric information does the bureaucrat have the ability to rent-seek.

The political authority has an incentive to impose control devices on the bureau in order to constrain the bureaucrat's discretion. Devices such as policies and processes (red tape) enable the political authority to receive more information and establish rules of behavior. These are costly methods and Breton and Wintrobe argue that the political authority will impose control devices up to the point where the marginal cost of the devices equals the marginal benefit from reducing rent-seeking by the bureaucrat. As Figure 3.3 shows line HJ is the marginal benefit from the use of control devices while line LR shows the marginal cost. Total expenditures on control devices will equal 0LIK.



Niskanen read both Migué and Bélanger and Breton and Wintrobe along with Earl Thompson's (1973) review of his book and incorporated their criticisms in his article, *Bureaucrats and Politicians* (1975). He concluded that while they had valid criticisms, the essence of his theory held. Niskanen specified a utility function that incorporated Migué and Bélanger's concept of the *discretionary budget.* He then specifies the budget and cost functions based upon this function. The utility function was specified as

(3.6) $$U = \alpha_1 Y^{\beta 1} P^{\gamma 1}$$

where Y is the monetary income of the bureaucrat and P is the perquisites to the bureaucrat. Output is not directly preferred by the bureaucrat. Neither is the budget nor efficiency of the bureau preferred directly. Their relationship to the utility of the bureaucrat is determined in the reward structure, functions which determine Y and P from output and budget levels.

Using the utility and cost functions, Niskanen proceeds to derive income and perquisite relations. These are specified as

(3.7) $$Y = \alpha_2 Q^{\beta 2}(B-C)^{\gamma 2}$$

and

(3.8) $$P = \alpha_3 Q^{\beta 3}(B-C)^{\gamma 3}$$

where Q is output and the variables B and C are defined in equations (3.1) and (3.3). Rewards to the bureaucrat whether in compensation or perquisites, come from output and the discretionary budget or B-C which is specified as

(3.9) $$(B-C) = (a-c)Q - (b+d)Q^2.$$

Utility maximization lies between maximization of B-C and output maximization (points s and v in Figure 3.2b). In this formulation, Niskanen no longer requires that budget maximization be equated with output maximization, but permits it to be determined by the discretionary power of the bureaucrat.

Margolis (1975) commented on Niskanen's more specific 1975 paper by raising three objections:

1. the number and sophistication of Niskanen's institutions is inadequate to analyze bureaucracy;
2. the use of consumer satisfaction to explain government behavior (through its objective function); and
3. the expansion of government worldwide has not been regular nor consistent, so other historical factors must be introduced to explain government growth.

Margolis states that "Devices like utility and reward functions can be justified by their usefulness in the development of interesting and verifiable hypotheses. In addition, especially for the case of public agencies, the functions should be evaluated by their sensitivity to policy variables, that is, by whether the arguments in the functions include the incentives which can be used to affect bureau behavior." (Margolis, 1975, 646). He criticized Niskanen's specification for not meeting these criteria. The model developed in Chapter 2 addresses this criticism by constructing a model with inputs related to policy measures (constraints and incentives) and the relationship of the inputs to both the output of the bureau and the rewards to the bureaucrat.

The Niskanen theory is relatively simplistic in its examination of bureaucratic behavior. One reason is that Niskanen dealt only with the behavior of senior bureaucrats, seeing them as the sole decisionmakers. However, if the preferences can be regarded as consistent, then bureaucrats at all levels will have these preferences. The assumption of self-interest should translate into similar choices, determined by the decisionmaking authority or the discretionary power of the bureaucrat at his level or department. The second reason is that the structure of the bureau developed by Niskanen lacks the depth needed to test the theory. This has been dealt with in Chapter 2.

From the self-interested nature of the bureaucrat, Niskanen's theory implies certain preferences. First, the bureaucrat will favor increases in the budget. He will tend to favor increases in budget items which increase income, both pecuniary and non-pecuniary, along with perquisites. However, the bureaucrat faces controls on the allocation of budgetary resources, so would prefer less in the way of controls, favoring

decreases in budget items used for auditing and cost control. Second, if an existing budget can be reallocated, the bureaucrat would reduce resources used to produce output in favor of expenditures that benefit him (salaries, benefits, perquisites). Finally, the lifetime income and wealth of the bureaucrat lies with his career progress. Every bureaucrat would desire the top job, seeing the senior bureaucrat as receiving the most income and perquisites. However, due to the competition he faces for promotion, he would always see his prospects as limited. He prefers the organization to grow, so he may grow also.

Dunleavy

Dunleavy (1985) presents an alternative model of a bureau to Niskanen's. His contention is that bureaucrats pursue *bureau-shaping* strategies rather than budget-maximizing strategies. There are two general reasons for his view. First, he sees the individual bureaucrat as having preferences not directly related to either the total budget or the part of the budget subject to growth. Individual bureaucrats operate within an environment in which no one official has complete control or influence. Thus budget maximization may not directly increase a bureaucrat's utility because it may be contrary to individual utility maximization. Second, the structure of a bureau includes constraints on areas of direct utility maximization, such as salary and perquisites. Public agencies tend to maintain tight control over these for the very purpose of preventing rent-seeking by bureaucrats. From this perspective, Dunleavy sees budget-maximization as essentially a *collective good* and the relationship of the budget to the individual's utility maximization

becomes more remote (Dunleavy, 1985, 302).

Dunleavy concludes that a bureaucrat's utility is based upon an ideal structure of the bureau and his discretionary abilities within that structure. The budget is developed within that ideal structure. For the bureaucrat, there are preferences which do not necessarily relate to the budget. Included are a collegial atmosphere, commitment to the goals of the bureau, including expansion of its 'mission,' managerial discretion, and an organization based on an ideal form. Increases in the budget are preferred when it promotes this ideal form. However, as the bureaucrat rises in rank, the preference for a larger budget is tempered by a higher personal cost of advocating that budget.

Using Niskanen's utility framework, the utility function of the bureaucrat in Dunleavy's model will depend on the budget and the advocacy costs associated with the budget and the level of the bureaucrat in the hierarchy. Starting with the same utility function as specified in (3.6) we have

(3.10) $$U_i = \alpha_1 Y^{\beta 1} P^{\gamma 1} S^{\eta 1}$$

Y, P, and S (bureau-shaping preferences) are defined as

(3.11) $$Y = \alpha_2 Q^{\beta 2}(B-\xi_i B^2)^{\gamma 2}$$

(3.12) $$P = \alpha_3 Q^{\beta 3}(B-\xi_i B^2)^{\gamma 3}$$

(3.13) $$S = \alpha_4 Q^{\beta 4}(B-\xi_i B^2)^{\gamma 4} \qquad 0<\xi_i<1$$

where ξB^2 represents the advocacy costs associated with promoting a higher budget. The subscript i represents the rank of the bureaucrat. The higher the rank the larger the ξ_i. One difference with Niskanen's specification is that he dealt only with the top bureaucrat, while Dunleavy saw the budget-maximizing *desire* as being less costly for a lower-ranked

bureaucrat. This condition may be testable within the game and experiment.

Substituting variables as Niskanen did, the utility function of the ith bureaucrat becomes

(3.13) $$U_i^b = \alpha Q^{\beta}(B-\xi_i B^2)^{\gamma}$$

where $\alpha=\alpha_1\alpha_2^{\gamma_2}\alpha_3^{\gamma_3}\alpha_4^{\gamma_4}$, $\beta=\beta_1\beta_2+\beta_3\gamma_3+\beta_4\eta_1$, and $\gamma=\beta_1\gamma_2+\gamma_1\gamma_3+\gamma_4\eta_1$. The parameter, η, determines the extent to which structural factors have an impact on output and the budget. A higher η will mean that structural changes will have a greater impact on output and the size of the budget. For the budget process, utility maximization occurs where the marginal budget equals the marginal advocacy cost.[3] Shifts in the advocacy cost function will shift the preferences of the bureaucrat, leading to either an increase or a decrease in the budget (more likely, a change in the rate of growth of the budget). These costs would be associated with increased uncertainty over career prospects, more controls, or even decreased income growth.

The Dunleavy bureaucrat is not unconcerned with the budget, but income and perquisites are not the only variables affecting his utility. Therefore, he will have many of the same characteristics as the Niskanen bureaucrat, particularly at lower levels. Overall however, the bureau-shaping nature of the Dunleavy bureaucrat will lead to differences with the Niskanen bureaucrat. First of all, he will value job satisfaction more highly than a Niskanen bureaucrat. In addition, he will be less inclined to redistribute the

[3] Dunleavy discusses the relationship between the discounted marginal utility and the marginal advocacy costs. Because we will be discussing this relationship in terms of the budgetary process, there is no guarantee that utility maximum is reached. This formulation incorporates the relationship in a fashion comparable to Niskanen.

budget to his own favor unless the budget is close to the ideal. Finally, Dunleavy maintains that the bureaucrat will have opportunities to work at other bureaus and will view his career prospects more positively than the Niskanen bureaucrat.

Meyer

Marshall W. Meyer's book *The Limits to Bureaucratic Growth* (1985) examined bureaucracy from the perspective of its birth, death and growth. Central to his thesis was the idea that bureaucrats had a preference for formal organization, because they internalize many of the spillover costs that alternative forms of organization create, for example, corruption and control losses. However, bureaucratic organizations, once created, tend to grow, becoming more complex and adopting some of the same characteristics as the organizational forms they replace. Thus, if bureaucracy is a problem, it is due to excessive growth rather than their existence.

Bureaucracy arose out of the concept of *rational administration,* which attempted to impose a business or machine model of organization. It was a response to the *spoils system* of the 1880s, which made the political machines powerful, but led to corruption and inefficiency in public expenditures. Scholars such as Woodrow Wilson (1941) believed that a `business-like' approach to public administration would improve efficiency. The reform movement led to the establishment of formal organizational structures with clearly defined hierarchies and the creation of a professional class through the Civil Service System. The success of the bureau in managing public agencies and reducing political corruption led to a consensus that bureaucratic organization was both

beneficial and preferable to political organization. If an administrative problem existed, it was resolved through a new or increased level of administration.

Meyer studied the municipal governments in Chicago, Detroit, and Philadelphia and found that bureaucracy was not a static phenomenon, but a dynamic one. Growth was an essential feature of bureaucracy. For example, he notes that all three cities had four organizational units responsible for finance functions in 1890, but by 1975 Chicago and Philadelphia had sixty-three each, while Detroit had fifty (Meyer, 163). He concluded that this growth was a result of the organization of functions within a hierarchical framework. To deal with problems and uncertainties associated by the increase in complexity as agencies grew, additional layers and structures (more organization) were established (Meyer, 185). Organization allowed functions and relationships to be formalized, creating a command hierarchy. This command hierarchy "introduced an *increment of certainty* (my italics) - or at least what was believed to be certainty - into organizations." (Meyer, 16). This also led to the establishment of a big, impartial government in which politics became separated from administration. Tasks were broken into simple arrangements and authority was diffused. This process increased the number of levels of administration and as new tasks presented themselves, new organizations and layers of hierarchy were created.

Reformers saw this as beneficial because the problems of politics were eliminated. The separation of politics from administration was reinforced by legislation such as the Hatch Act, and the problems of administration were dealt with through simplification of tasks and additional administration. Meyer noted, however, that the outputs of

governments were not easily related to expenditures (Meyer, 21-22), so that efficiency came to be interpreted as punctuality, honesty, and especially conformity to rules, i.e. trivia.

The increment of certainty is an important aspect of organization, according to Meyer. As he states, "Organization is a response to uncertainty." (Meyer, 60) Members are certain of their responsibilities and authority. More importantly, formal organization meets the *demand for control* of expenditures and operations that was a requirement of the reform movement. Meyer explains that control occurs at the expense of economy and efficiency (Meyer, 65) leading to preferences that conflict with minimum costs. Control leads to rules and additional hierarchical administration, and rules and hierarchical administration lead to less uncertainty. The Meyer bureaucrat can be viewed as risk-averse, seeking to reduce risk by increasing layers of control and increasing the costs associated with this.

Given that the rewards to public employees are not tied to riskiness, this leads to a preference for minimizing risks associated with those rewards. Thus Meyer's theory states that bureaucratic preferences are a function of hierarchy and control, given a compensation constraint. Hierarchy and control depend upon administrative and control expenditures (X_2 and X_4 in our model). Thus Meyer's bureaucrat has preferences specified as

$$U^b = Y^{\alpha 1} X_2^{\alpha 2} X_4^{\alpha 3}. \tag{3.14}$$

The bureaucrat receives compensation, but his career is also dependent upon the success of the bureau in minimizing risks to himself and other members. Waste and fraud lead

to uncertainty over employment, but the increase in uncertainty does not lead to an increase in compensation which is constrained by regulations. Even when perquisites can be obtained, the increase in risk is usually greater than the increase in utility from the perquisites. Contrary to the Niskanen and Dunleavy models, most bureaucrats tend to be risk-averse, avoiding actions which may put their jobs at risk. Thus delegation of authority, committee structure, strict adherence to rules, and increased layers of administration reduce risks to the members. Most bureaucrats are honest, but inflexible, relying on red tape (more X_1) and the formal structure (X_2) more than an entrepreneur would.

Meyer believed that the problems of bureaucratic growth arise from the concept of rational administration. The formalism of structure leads to the growth of subunits and Meyer found that the bureau's chances for survival increased with the number of subunits, allowing growth to reduce uncertainty about the bureau's future (Meyer, Chapter 7). In addition, organization reduces complicated environments to manageable proportions, reducing uncertainty, but Meyer concluded that many uncertainties are irreducible, leading to the continued growth of formal organization with few incentives to stop growing.

The Meyer bureaucrat is essentially a risk-averse administrator, preferring more organization to less, more control to less. Part of this may be due to the inability of the bureaucrat to receive rewards from flexibility and looser forms of organization. The Meyer bureaucrat will desire larger budgets, as does the Niskanen bureaucrat, but favors increased budgets for control functions and not for functions that increase income and

perquisites. He actually has a greater desire to control costs than either the Niskanen or the Dunleavy bureaucrat.

Conclusion

The theories selected are not the only theories available, but they offer a basis for the next stage in our analysis, the development of a game form for examining strategy sets and outcomes based upon these preference structures. Once the game form is developed, the budget game can be implemented and the outcomes compared to the strategy sets to test the validity of these theories.

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4. THE BUREAUCRACY GAME

Within the daily activity of a public agency, the principal-agent problem can lead to budget decisions at odds with public preference. Yet the bureaucrat would not (nor could not) necessarily admit his intentions, anymore than a businessman would describe himself as equating marginal revenue to marginal cost. Testing any theory of bureaucracy can lead to the preference revelation problem when incentives exist to hide those preferences. To overcome this problem, any test must be designed in a way that creates incentives to reveal preferences or at least not hide them. It is our purpose here to develop a game which will be *incentive-compatible*, so that the subject voluntarily makes the desired response.

Even if the subject is a Niskanen bureaucrat seeking to maximize selfish interests (salary, perks), he would not want to admit it in a survey or budget allocation experiment. Truthful responses would damage his reputation. Thus incentives exist to misrepresent true preferences. However, the subject can be expected to support budget allocations which would correspond to his selfish interests. For example, the Niskanen bureaucrat would desire more budget for his department, as distinct from the other departments, since this leads to increases in the bureaucrat's salary and perks. Therefore, if the researcher can design a mechanism to take advantage of this correspondence, then the administrator's true preferences may be revealed.

Fortunately, both the principal-agent problem and the preference revelation problem are problems of hidden information. There has been significant research on this

subject upon which we can draw. We can apply this research to the design of an experiment, involving both a survey and a budget allocation game, which can require subjects to answer questions and make budget allocation decisions consistent with preferences. An improperly designed experiment will allow other decision variables to become a factor, potentially invalidating the results.

Using the bureau environment and the preference functions described in the various theories of bureaucracy, we will attempt to describe a game which will replicate, as closely as possible, the conditions of unbiased preference revelation. The next section will discuss preference revelation games and their equilibrium concepts. Finally, the budget game will be developed and simulations performed for different types of bureaucratic preferences.

The Preference Revelation Problem

The preference revelation concept (like the principal-agent problem) deals with hidden information. Party A is endowed with characteristics (preferences) and party B must discover what those characteristics are through a mechanism or game form which induces the subject to reveal his true preferences. Therefore, preference revelation problems are resolved by developing strategies which achieve *incentive-compatibility*. This means that there are no incentives to lie. Party B seeks to maximize payoffs subject to the incentive-compatibility constraint.

The best known example of a game which reflects the problem of hidden information and incentive-compatibility is Akerlof's market for lemons (Akerlof, 1970).

The seller of the used car knows the true value of the automobile (good car or lemon) while the buyer does not. The equilibrium concept associated with the market mechanism is that the car is a lemon if the seller chooses to sell it. If it is not a lemon, the seller does not sell. The buyer offers a price low enough to force this decision, revealing the true characteristics of the seller's car. Like the lemon model, preference-revelation problems are also problems of *adverse selection.* The risks associated with truthfully giving information lead subjects to hide the facts like the buyer who lowers price to avoid the risk of buying a lemon.

Preference revelation problems are common in public choice theory. However, most discussions have centered on the demand for public goods rather than its supply. The government considers providing a public good, but will do so only if the sum of the public's valuations equals or exceeds the cost. The government must discover valuations. Varian (1984, 257) provides an example of this problem. If the government simply asks the citizens their willingness to pay, the citizens would have incentives to over-report or under-report. Varian demonstrates that mechanisms exist to make truthful revelation of willingness to pay for the public good a dominant strategy for the citizens. Based upon their characteristics, their responses will differ. Two well known strategies are the Groves Mechanism (Groves and Ledyard, 1977) and the Tideman-Tullock Mechanism (Tideman and Tullock, 1976).

Public production, or bureaucratic output, has not been subjected to the same type of examination as the demand for public goods. One purpose of this chapter is to develop such an examination. The analysis developed should apply whenever resource

allocation decisions by bureaucratic decision-making occur. Therefore, the analysis can extend into any hierarchical organization, whether public or private. This analysis is similar to principal-agent games because of hidden information. However, in principal-agent games the desire is to provide incentives to adhere to the principal's interests, while the preference-revelation game is designed to identify the agent's (subject's) preferences.

Preference-revelation is not a simple case of lying, but of preferences being directly tied to certain expenditures, though the tie may not be obvious to the subject. For example, maintaining or increasing the size of a public agency reduces the risks of unemployment, a direct benefit to the staff of the agency. Therefore, as long as there is a constant or increased need for the agency's services, there is security. Thus while the staff will believe that the services are needed without viewing this as a direct benefit to themselves, they will choose expenditure patterns that support these preferences. Nevertheless, the subject may be induced to bias his response if he perceives that truthful answers may have a negative impact on his reputation. Normally, the subject chooses actions which reflect his truthful preferences. However, within an artificial environment (an experiment), uncertainty over the effect of truthful responses on his reputation may carry a higher weight than otherwise and he may make a choice that is less risky to personal utility although not otherwise as valuable. We can see that the question of risk is inherent in the game being played. As a matter of fact, preference revelation can also be modeled as a question of risk or uncertainty.

Choices made by the subject, whether survey responses or budget allocations, offer the potential to reinforce preferences. The researcher, aware of the potential bias, can structure the questions to minimize the risks associated with the response. Anonymity is one way to reduce the risk since the response is not identified with the subject. Another way is to ask for responses to questions that are not directly related to the preference structure of the subject, but which complement the preference structure. As noted above, Varian explains that there are schemes which will elicit true preferences. The researcher must construct a mechanism to elicit these true preferences.

Preference Revelation Games

In this section, we will develop a formal model of a preference revelation game and associated equilibrium concepts. Essentially, the literature has discussed a variety of approaches and problems associated with mechanism design. Akerlof (1970) discussed the problems of using the market mechanism for discovering the quality of used cars in the automobile market. Gibbard (1973) discussed the problem of strategic voting. He showed how a voter may not vote as he prefers when the situation is such that truthful voting may result in a less favored outcome. Instead, he may vote 'strategically' by choosing a less favored vote in order to bias his response and improve the probability of achieving a higher valued outcome. Gibbard showed how any scheme that characterizes honest voting as a system will lead to strategic voting. Tideman and Tullock (1976) developed a mechanism, based on Clarke (1971, 1972), that allows individuals to pay for changes in the outcome, creating incentives to reveal preferences. Groves and Ledyard

(1977) developed a mechanism of government allocation-taxation rules to encourage consumers to reveal their true preferences for public goods. Their mechanism is interesting in that it occurs within a general equilibrium model. Dasgupta, Hammond, and Maskin (1979) discuss implementing social choice rules which reveal preferences and are incentive-compatible. Roberts (1979) looked at the payoff functions in the context of planning procedures with public goods. Meyerson (1979) discussed constructing choice mechanisms that do not give incentives for dishonesty within a Bayesian framework.

Much of the above work supports the hypothesis that a mechanism can be designed to drive our experiment. The experiment, based upon the work of the economists at the University of Turin (see Piperno and Santagata, 1987), utilizes both a survey mechanism and a budget-allocation mechanism. Therefore, the mechanism or game form is predetermined and our analysis will establish conditions for this mechanism to maximize the probability of truthful revelation of preferences. We will begin by developing a model based on Dasgupta, Hammond, and Maskin (1979).

Assume there is a finite set $I = \{1, \ldots, n\}$ of subjects. Each subject $i \in I$ has a characteristic θ_i on which depends i's preference ordering $R(\theta_i)$ on set X, the set of possible outcomes. The researcher does not know i's characteristic, θ_i, except that it is a member of a fixed set of possible characteristics Θ. Assume also that there is a feasible set $A \subseteq X$.

DEFINITION 4.1. For any feasible subset $\boldsymbol{\theta}$ of $\boldsymbol{\Theta}$, there is a function $f(.)$ which specifies a non-empty choice set for any nonempty set $\boldsymbol{\theta}$ in $\boldsymbol{\Theta}$ and is called a choice function defined over $\boldsymbol{\Theta}$.

Paraphrasing Sen (1971, 307), a 'choice function' is a functional relation that specifies a choice set $f(\boldsymbol{\theta})$ for any $\boldsymbol{\theta}$ in a particular domain of non-empty sets of $\boldsymbol{\Theta}$. Therefore, f: $\Theta \rightarrow A$ is the mapping of elements of Θ to outcomes in A. This leads to a set of preference orderings $\Theta \rightarrow \mathbb{R}$ which, given a θ_i, will determine a preference $a \in A$ over $b \in A$ or aRb. We will assume that $\mathbb{R} = \{R(\theta_i), \mathbb{R}_{-i}\}$ where $\mathbb{R}_{-i}$ represents the alternative preference orderings that subject i may choose.

If $R(\theta_i)$ is the truthful preference ordering, the question facing the researcher is how to construct a mechanism which reveals that ordering. Because the true preferences of the subject are not known by the researcher, he must choose a mechanism or game plan which induces the subject to choose an outcome consistent with his true preferences. He must specify a choice function $f(.)$ which is consistent with the subject's true preferences. The literature above demonstrates that, from the perspective of the demand for public goods, there are mechanisms (choice functions) available to reveal true preferences. This implies that mechanisms may also exist to reveal supply decisions, or bureaucratic preferences. Sen (1971, 308) notes that there are many ways to generate binary relations of preference from any choice function. Our task will now be to discuss conditions under which a mechanism can reveal preferences from the supply side.

A properly designed mechanism generates a revealed preference ordering R which corresponds to the preference ordering $R(\theta_i)$ generated by an implicit choice function. That is, if a choice function exists that generates $R(\theta_i)$, but that choice function or its preference ordering cannot be observed and another choice function is specified that generates an equivalent preference ordering R and can be observed, then it is a properly designed revealed preference choice function, or *incentive-compatible*.

Following Sen (1971, 309), corresponding to each choice function $f(\theta)$ we may define its 'image' $f'(\theta)$ as the choice function generated by the binary relation R revealed by $f(\theta)$.

DEFINITION 4.2. For any A in X, $f'(\theta) = [a \mid a \in A$ and for all b in A, $aRb]$.

The choice function, $f'(\theta)$, chooses a as it best element in A over any alternative b. Then the choice function $f(\theta)$ generates the binary relation R, and since $f(\theta) \subset f'(\theta)$ and $a \in f(\theta)$, it implys that for all b in A, aRb. The researcher designs a choice function $f(\theta)$. If $f(\theta)$ has as its image $f'(\theta)$, then the binary relation R implies the true preference ordering. This next definition is that of *monotonicity*.

DEFINITION 4.3. A choice function is *monotone* if for $f(\theta)$ and $a \in f(\theta)$, $aRb \Rightarrow aR'b$ where $f(\theta_i) \rightarrow R$ and $f'(\theta_i) \rightarrow R'$, , then $a \in f'(\theta)$.

Monotonicity implies that if the preference profiles are identical, then the choice functions must be the same. Dasgupta, Hammond, and Maskin (1979) discuss the

importance of monotonicity in implementing a social choice function.

Definition 4.2 specifies the choice function which is not observed. Definition 4.3 states that the specified choice set is properly designed if it is equivalent to the unobserved choice set for all feasible outcomes A, or *incentive-compatible* and *implementable.*

Consider strategic voting. Gibbard (1973, 587) provided a rank-order voting scheme. Each of three players is asked to rank four alternatives. The first place on a ballot is given four points, the second place, three, the third place, two, and the fourth place, one point. A player's ranking is a signal of his preferences. The alternative with the most votes wins. the voters make the following rankings: voter a chooses $xyzw$, voter b chooses $wxyz$ and the true preferences for voter c are given by the choice $wxyz$. If c chooses according to his true preferences, then his second choice, x, wins with ten points. If c places x last, then x receives only eight points and w, his most preferred choice wins. Thus c has an incentive to misrepresent his preferences.

The rank-order voting scheme is a choice function, but one that is not consistent with a choice function that induces c to vote honestly. In this case, c bases his ranking on the expected rankings of the other voters. Consider an alternative choice function where only one choice is made. In this case, c has no incentive to misrepresent his preferences; he will choose w, and knowing b will also choose w, his preferred outcome will occur. The one-choice scheme is a better preference-revelation and consistent with the choice function that has c choose his preferred ranking of all as defined by Definitions 4.2 and 4.3. The true rank-preference scheme is the image of the one-choice

scheme, but not of the rank-order scheme.

However, note that the converse is not true. since the ranking *wzyx* is possible, voter *c*'s choice of *w* is not necessarily the image of the true rank-preference choice function. An alternative choice function which would be true in the converse is a rank order where only *c*'s rankings matter, then *c* would state his true preferences. In fact, all three voters have no incentive to misrepresent their preferences, so that for every θ_i in θ, the outcome reflects their true characteristics.

One proviso exists in the second revealed preference voting scheme. There is still no incentive to be honest since it does not matter what the ranking is beyond the first choice because only the choice ranked first is important. We will therefore adopt the assumption of *Epsilon Truthfulness*: If the agent is indifferent between lying and telling the truth, he tells the truth. (Rasmusen, 1989, 161).

The mechanism designed by the economists at the University of Turin is an example of a *direct mechanism* (See Dasgupta, Hammond, and Maskin, 1979). The responses to survey questions and budget-allocation decisions send signals to the researcher about their characteristics. Gibbard's rank-order scheme is another example. In general, direct mechanisms ask for a preference ordering aRb. Incentive-compatible mechanisms induce an ordering $aRb \Rightarrow aR(\theta_i)b$. The survey mechanism is a game form in that the subject is asked a series of questions and chooses from a fixed set of responses. The outcome a_i is a vector of responses $\{a_{ij}\}_{i\in I,\ j\in M}$ determined by the strategy set of the subject. Given the characteristic of subject *i*, the outcome a_i will be a signal to the researcher. One advantage of this design is that the subject, in answering

specific questions, will have fewer incentives since individual questions focus on specific aspects of the subject's characteristics. For example, questions about political philosophy provide no direct information about budget-allocation decisions, but may be a signal for budget allocation preferences. Conservatives desire less government, so would prefer smaller budgets. Liberals may desire the opposite. However, conservatives may be more self-interested and thus desire resources to shift toward their own department and away from another, while a liberal may be more altruistic and desire allocations to remain unchanged. Thus the question of political philosophy is a signal about budget allocation preferences.

DEFINITION 4.4. A survey game form, g, is a choice function g: $S \rightarrow A$, given $a_i = g(s_i) \in A_i$ and $s_i \in S$. S is the set of possible strategies.

In a direct mechanism, the strategy space, S, is the set of possible characteristics θ. Thus a strategy will correspond to a characteristic. An equilibrium, $E_g(\theta)$, consists of a strategy set $s^* \in S$ where given the true characteristics of the subject, the outcome will be a signal of those characteristics. That is, given an θ_i, there will be a strategy, s_i^*, which leads to an outcome that signals true preferences. However, there is another strategy, s_{-i} , which can also be chosen. Equilibrium occurs when the subject chooses $s_i,^* \in s^*$.

The Budget Game

The budget game consists of two sections, an opinion survey and a budget allocation decision game. In the survey section, subjects are asked questions and are asked to choose from a fixed set of responses. The budget allocation decision section asks them to take an actual budget, for a fixed set of categories and reallocate it as they see fit. The survey places constraints on the budget allocation decision game so that opinions expressed in the survey will induce consistency in the budget allocations.

Consider the game itself. Nature chooses the characteristics of the subject. The researcher seeks the subject's agreement to participate in the game. The subject first accepts or rejects, then either tells the truth or lies. In agreeing to participate, the subject must see a benefit. Thus the researcher must provide an incentive to induce participation. The subject is aware that the survey is designed to extract information from him and will respond to questions based upon the incentives offered for telling the truth and lying. In game theory, lying occurs only when there is an incentive to lie. In other words, if the subject is indifferent between lying and telling the truth, he will tell the truth. This known as *Epsilon Truthfulness* (Rasmusen, 1989, 161). Given Epsilon Truthfulness, the researcher must design questions which create no incentives to lie. One benefit to the subject is that his responses may have an impact on future budget allocations. The researcher, committing to report his findings to the senior managers, can induce participation. The subject then sees the potential to influence senior management in beneficial ways. However, this can also create incentives to lie since the subject may believe truthful responses may hurt his reputation. Therefore, many surveys

maintain anonymity, reducing reputation effects and incentives to lie. The equilibrium strategies are then for the researcher — choose game form that offers benefits for participation and no incentives to lie — and for the subject — agree to participate and respond truthfully.

Developing Strategy Sets

The subject faces two decisions, agree to participate and choose a set of responses and allocations. The questions and budget categories, designed to be related to the subject's preference structure, establish a correspondence with the unobserved choices made by the subject and allow us to map preferences onto strategies through the choice function g.

The design of survey questions is essential to the successful implementation of the choice function g. The questions must be designed to induce responses consistent with the hypothesized characteristics (preference orderings). Therefore, the first step is to develop the set of questions and associated responses.

The proper design of questions is an important aspect of any survey since the responses can depend on the way questions are asked. An example is given by Sudman and Bradburn (1982, p. 1) in their book on questionnaire design, *Asking Questions*. Two priests, a Dominican and a Jesuit were discussing whether it was a sin to smoke and pray at the same time. Unable to resolve the argument, they agreed to ask their superiors and report back. The next week, they met and the Dominican asked "Well, what did your superior say?" The Jesuit responded "He says it was alright." "That's funny." the

Dominican replied. "My superior said it was a sin." The Jesuit inquired "What did you ask him?" The Dominican replied "I asked him if it was alright to smoke while praying." "Oh" said the Jesuit, "I asked him if it was alright to pray while smoking."

The experimental approach taken in this thesis deals with attitudes. In particular, the information to be revealed may be sensitive to the subject, so that direct questions about preferences and attitudes can yield biased responses. However, this is familiar territory in survey design. Market research studies always structure questions to generate responses to several nonthreatening questions which elicit information about sensitive matters. For example, income is a sensitive subject to respondents and they may not respond honestly, so general questions about profession, level, and lifestyle generate data which corresponds to income levels. Therefore, the data can provide valid information about income without asking a direct question.[1]

The sample questions chosen in Appendix A reflect principles of questionnaire design. These principles determine the strategy set of the researcher.[2] First, the initial questions should be nonthreatening. Background questions are a means to reducing the concerns of the subject and initiating a favorable attitude toward the survey. Second, the questions should be clear and precise, so the subject will not be unsure of his answer. Third, the language should be familiar and the questions should not show bias. The questions should not lead to an answer. Fourth, the questions should meet the criteria

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[1] This is a demonstration of correspondence of the questionnaire to Sen's *image*.

[2] Sources for these principles include Dillon, Madden, and Firtle (1987, Chapter 12) and Sudman and Bradburn (1982, Chapters 5, 6 and 8).

of validity and reliability. This is the most difficult, but a clear construction of the hypothesis to be tested provides the foundation for the proper questions to be asked. In this case, the hypothesis is that this approach provides valid information about a bureaucrat's preference structure through questions about attitudes and budget allocation. The questions must have a direct correspondence to the theories so the subject's responses can compare with the predictions of the theory. Finally, layout must follow a logical order and flow for the subject. Each section should lead naturally to the next, so that the subject is not disrupted in his thought processes and does not, therefore, become more biased in his responses.

Because direct questions can lead to biased responses (as with questions regarding income), the strategy of the researcher is to ask questions which elicit responses that complement preferences. For example, a nonthreatening question about whether the subject's departmental budget is too small can lead to a yes response. However, a yes response supports the Niskanen view since Niskanen bureaucrats are budget maximizers. When combined with other nonthreatening questions, the totality of responses can provide evidence that the subject is a Niskanen-type bureaucrat.

Appendix A shows a set of preference statements and responses with their correspondence to the preferences discussed in chapter 3. A summary of these responses corresponding to the theories shows how these questions provide support for the theories discussed.

Niskanen

Niskanen's bureaucrat has a preference structure that relates the budget to salary and perks. Thus he is a budget maximizer because his salary and perks are larger as the budget increases. Depending on the constraints, he will generally choose larger budgets (including staff and discretionary funds) and will tend to favor more rather than less government, since more government benefits him. He would view constraints negatively, particularly rules and regulations which constrain his discretionary behavior. He would also favor his department over others, although he would be indifferent to other departments as long as what happens to their benefits does not negatively impact his department.

Referring to Appendix A, several questions seek responses consistent with the Niskanen theory. For example, a Niskanen bureaucrat would agree with statement Q16 (Public servants are burdened by too many rules and regulations) because he desires more discretion. Rules and regulations reduce discretion and prevent him from maximizing his income and perquisites. He would agree with statement Q35 (Managers can be more effective with increased independence and discretion) since this enables him to increase his direct benefits from the budget. Accumulated responses which coincide with the theoretical predictions increase the probability the subject is of the self-interested Niskanen type.

Dunleavy

Dunleavy's bureaucrat is influenced not only by the size of the budget, but also his rank in the hierarchy and the functions of his department. His interaction with the sponsor gets closer as his rank gets higher, so that deviations from the ideal shape and size of the bureau have more negative impacts on his salary and perks. Because he is more concerned with *bureau-shaping*, he will tend to favor more equity in budget allocations and would be more willing to state that his agency may not be efficient or may be too large. Therefore, his responses are conditioned on his general views and his rank in the agency. The lower his level, the more likely he would favor larger budgets.

Referring again to Appendix A, if the subject agrees to statement Q15 (Our organization needs to broaden the scope of its responsibilities in mass transportation), Dunleavy bureaucrats in mass transportation favor expansion as part of their organizational goals. Therefore, an agreeable response is consistent with the Dunleavy theory. Some statements will have responses that differ by the bureaucrat's rank in the hierarchy. If differences in responses are due to rank, then they are consistent with Dunleavy.

Meyer

The Meyer bureaucrat favors more organization because of the uncertainties associated with government activities (or within any organization for that matter). Potential misuse of funds and inefficient spending must be controlled in the Meyer world. Therefore, the bureaucrat will always desire a larger budget, favoring control-oriented

budget expenditures. Thus salary increases may not be as important and equipment and staff increases may not be favored, except in areas such as the Controller's department and auditing functions. The Meyer bureaucrat will not view government as over-regulated since he sees regulation as a control mechanism of which he favors more. His preference structure is tilted to larger budgets, but he would be expected to favor control functions, especially if he is at a higher level and he is in the Controller/Auditing/Legal departments.

Referring to Appendix A, the Meyer bureaucrat would disagree with statement Q16 (Public servants are burdened by too many rules and regulations.) This is in direct contrast to the Niskanen bureaucrat and reflects the preference of the Meyer bureaucrat for reducing uncertainty by adding layers of rules and administration. He would also disagree with statement Q25 (My organization spends too much time 'watching the pennies').

Individual statement responses can be determined by random factors, but the more the responses are consistent, the greater the probability the subject is of a certain type. Many of the answers will be the same for all theories, but as long as key questions force a clear response, enough deviations should at least invalidate a particular theory.

Conclusion

The budget game developed is designed to elicit responses which would correspond to the preference structure of the bureaucrat. As demonstrated by others, it is possible to design a choice function or game form which enables us to induce a

preference ordering similar to the true preference ordering of the bureaucrat. We have also seen that differences in the preference structure lead to different strategy sets. We must recognize, however, that the game form (the survey question and budget allocation design) must be carefully designed to maximize consistency in responses, given preferences.

In the next chapter, we will apply these principles to developing the experiment. If the experiment is properly designed, the responses should provide evidence that this experimental approach can give valid information on the preferences of bureaucrats.

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5. DESIGN AND EXECUTION OF THE EXPERIMENT

In Chapter 2, we discussed how a bureau allocates resources among different productive units and how the allocation of those resources can depend on the preferences of the bureaucrat. In Chapter 3 we discussed three theories of bureaucracy and identified the preferences associated with each. Our goal is to test these theories by identifying which preferences are revealed in our experiment. In Chapter 4 we showed that a game form can be developed to elicit responses which can be used to test these theories. In this chapter, we will discuss the design of our experiment and how it applies the principles set forth in Chapter 4. Then we will discuss the execution of the experiment and the results. Ultimately, we seek the answers to two questions: does this approach provide valid information about preferences and does this information support any of the theories. We will see that the survey and budget allocation mechanism works well and can provide statistically valid data.

One reason for designing this kind of experiment is that traditional methods of collecting field data do not work well in these cases. Government statistics on spending patterns and budgets do not reveal the preference structure of the bureaucrat. Applying game-theoretic models with this data was not very productive. As Roth (1991) explains, early classical game-theoretic models of bargaining were resistant to tests of field data because they depended on difficult-to-observe elements of the bargainer's preferences. However, 'laboratory' experimentation can control for these factors and allow for predictions to be seen more clearly, without irrelevant factors interfering. This can be

especially important in the study of bureaucratic preferences.

A laboratory experiment must be carefully designed to be of value. There are three factors influencing this design: the state of nature, the behavior set of the participant, and the consistency of the results. The state of nature is a set of predetermined and exogenous variables facing the participant. Given the state of nature, the participant will choose a response. In the real world, the state of nature includes not only variables of direct interest, but also (and more likely) extraneous variables that will affect the participant's responses. The laboratory experiment should minimize the impact of these extraneous variables, although it is not always clear which variables fall into this category.

Roth (1991, 112) has noted that "even in situations designed to be particularly susceptible to game-theoretic analysis, it is hard to specify *precisely* what game is being played." A poorly designed experiment can allow the subject to play 'hide my preferences' when the researcher is intending to play a preference revelation game. Therefore, it is important to control the behavior possibilities of the participants and how they will affect the experiment. A well designed experiment will allow the researcher to construct the set of possible responses and constraints on behavior to minimize the effects of extraneous strategies. For example, knowledge of the purpose of the experiment could lead a selfish bureaucrat to minimize the rent-seeking decisions he would normally make.

Finally, the results must be consistent. Given the same institutional characteristics, all participants should give the same responses, what Smith (1989, 156)

would call institution-specific. Any differences in those responses should only be due to differences in the type of bureaucrat. In designing the experiment, the institution-specific responses must be controlled or taken into account, so that the responses are as institution-free as possible. In this way, the results can be compared across organizations as well as organizational type (mass transit versus health care).

Ultimately, our purpose was to construct an experiment that would elicit responses that reflect attitudes and use current and/or historical budgets to determine the correspondence between preferences and budget allocations. By using a survey and budget allocation game, as discussed in Chapter 4, and by selecting respondents at random, we were able to apply the principles of preference revelation games and test theories of bureaucracy. We believe this design is consistent with the three conditions discussed above and provides valid data.

The Turin Experiment

Our experiment is based upon one developed at the University of Turin.[1] In The Turin experiment, subjects were given a 'synthetic graphic' (a paper bar graph) that described ten categories of the local public budget and four categories of revenues. The subjects were then asked which categories they would modify, indicating increasing or decreasing the budget for those categories with +, -, or = under the appropriate categories. Next, using coupons, the subjects were asked to choose the coupon that best

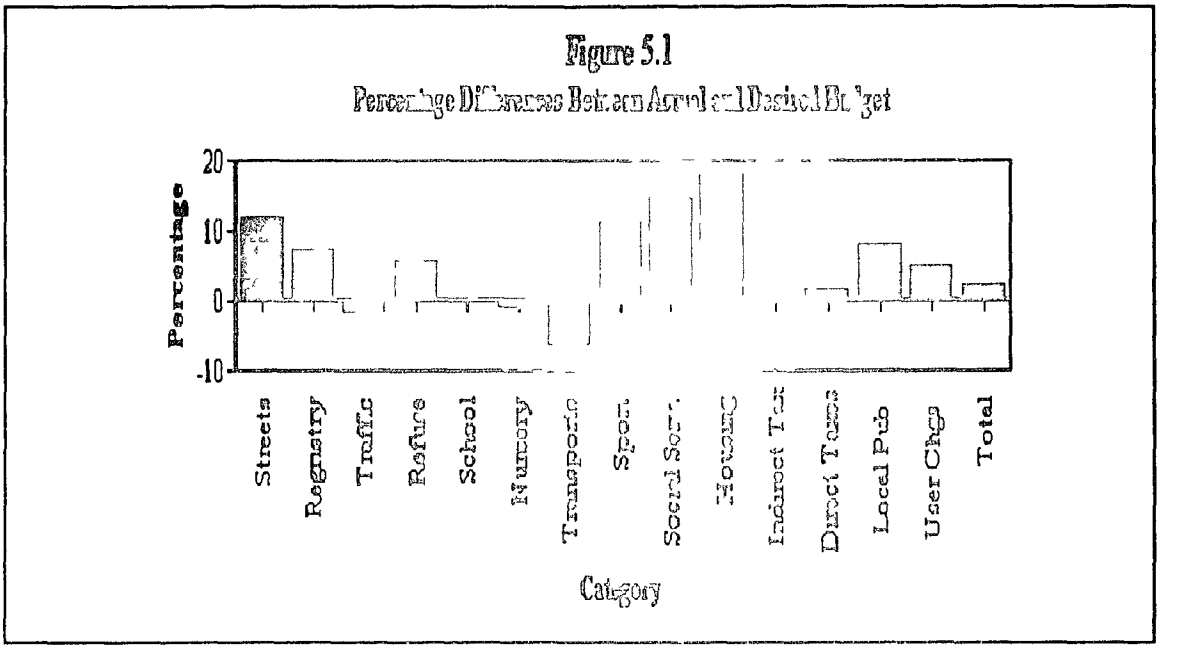
[1] Piperno and Santagata (1987) provide a discussion of the experiment used in studying the demand for public goods.

Table 5.1
Strategy Choices of Participants

Strategy	Percent
Coupons not used.	7.5%
Expenditure structure modified without modifying revenue structure.	19.8%
Revenue structure modified without modifying the expenditure structure.	0%
Both the expenditure and revenue structure were modified, thus keeping the budget constant.	6.2%
Both total expenditure and total budget were decreased.	19.6%
Both total expenditure and total budget were increased.	46.9%

reflected his desired value and place it over the original bar in the graph. Increases had to be offset by decreases. Finally the subjects were asked to provide greater detail. Then they answered a questionnaire regarding their personal characteristics and attitudes toward municipal government.

The expenditure categories available were: street maintenance and lighting, registry office, traffic control, sewage and street cleaning, schools, kindergartens, public transport, sport, parks and arts, social welfare, vocational training and other municipal services like chemist's shops; housing. The revenue categories were: direct taxes, indirect taxes, local public debt, and user charges (Piperno and Santagata, 1987, 5). These were reflective of the actual budget categories to which the municipal government allocated funds, and the amounts (stated in per-capita lire) were actual amounts. The subjects would reallocate these to their desired levels. The data generated by the



experiment was expected to provide information regarding the 'political dissent' from public preferences.

The subjects were given the choice of six strategies. Table 5.1 shows the set of strategies and the percentage of participants who chose each. The last strategy, increasing both expenditures and revenues, was the most popular at 49.6%.

Figure 5.1 shows the differences between the actual budget and the respondents' desired budget. For example, respondents wanted to increase expenditures on street maintenance (Streets) by 11.9% above the actual, but desired a 2.0% decline in the expenditures for traffic wardens (Traffic) than the actual budget. Overall, the respondents favored an increase in taxes, user fees and debt with the total budget to be 2.4% higher than the actual budget.

There were two major problems with the experiment. First, questionnaires were sent out by mail to respondents. This approach suffers from a lack of control over the

environment in which the game was played. The uncertainty over the environment during the test increases the extent to which other exogenous factors influence the responses. The second problem lay with the approach itself. The experiment called for the respondent to make budget decisions, then answer questions about preferences. This can lead the respondent to answering questions to justify budget choices. In other words, the respondent is more likely to base preferences on the budget choice, rather than make budget choices based upon preferences.

The Pittsburgh Experiment

The Turin experiment studied the demand for public goods, but a similar approach can provide information on the attitudes of suppliers of public goods, namely bureaucrats. This experiment would resolve some of the problems of the Turin Experiment while applying the game form discussed in Chapter 4 with questions based on theories of bureaucracy as discussed in Chapter 3.[2]

Participants would initially be given a copy of the current budget and its changes from the previous year. Then they would respond to a set of statements dealing with their background, career expectations, perspectives on government, their industry, and their agency. Next they would be asked to state whether different budget categories should be increased, left unchanged, or decreased. Once this survey part is done, the

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[2] One notable feature was our decision to utilize computer technology to create a graphic similar to that used in the Turin Experiment, but one that is more easily manipulated. In addition, all responses would be automatically recorded, reducing errors from misreporting responses.

respondents would be asked to reallocate the current budget among six categories reflecting divisions and functions, then allocate an increase of twenty percent in the budget, and finally allocate a twenty percent cut in the budget. The order of the experiment is important as the respondents are first encouraged to think about preferences, then think about the budget. Allocating an increase in the budget is shown before allocating a decrease since it is a more pleasant decisionmaking process (it is always nicer to be able to give than take away) and the cuts are seen as less ominous as a result.[3]

Port Authority of Allegheny County (PAT) Survey

The experiment was conducted at the Port Authority of Allegheny County in Pittsburgh, Pennsylvania, during the week of August 22, 1994. PAT is a mass transit organization primarily operating bus and light-rail transit services throughout the Pittsburgh metropolitan area. Fifty-one participants were selected, of whom forty-eight responded. A programming bug was discovered in the initial responses and reduced the usable data to forty-three responses. Table 5.2 shows the organizational make-up of the organization and its 1994 fiscal budget. Since the divisions closely reflected the various functions (Transit Operations - output oriented; Finance - control functions), we used the

[3] Dillon, Madden, and Firtle (1987, 358) suggest easy choices be made first and that adding to the budget is easier than cutting. In conducting the experiment, I found the respondents to be less intimidated by decreasing the budget than I expected. In part, the 'computer game' approach interested them. The time and effort they showed in both increasing and decreasing the budget, along with their comments, suggested to me they were interested in making these choices.

Table 5.2
Organizational Divisions and 1994 Fiscal Budget
for the Port Authority of Allegheny County (PAT)

Division	Budget	Incr/Decr	% Change
Executive Director	261	38	14.56
Corporate Services	4,343	306	7.05
Finance	21,859	1,068	4.89
Transit Operations	123,694	(4,905)	-3.97
Planning, Engineering, and Construction	21,747	4,309	19.81
Human Resources	31,586	1,781	5.64
Marketing and Business Development	2,927	10	0.34

Note: The Executive Director was combined with Corporate Services in the experiment.

divisional structure as a basis for categorizing the budget. This made it easy for respondents to connect budget functions with their experience.

Respondents were selected at random and distributed evenly among the divisions except for transit operations. This division being the largest, it was broken into the Maintenance section and the Operations and Administrative section of the division. As the breakdown was determined by PAT, it was not a controllable factor for us. However, the impact should not be significant. In addition, PAT provided us with a room in which to conduct the survey. This helped to create an artificial environment free from distractions.

Along with the experiment, we gathered information on the organization to evaluate its performance relative to other transit organizations to be surveyed. We examined significant events which would have had a positive or negative effect on attitudes, impacting preferences. For example, a major layoff program would cause all types to view a public sector career negatively even though, theoretically, only the

TABLE 5.3
Background Questions and Frequency Responses

Question/statement	Response
Q01 Are you married?	
1 Yes	37
2 No	6
Q02 What is your level in the organization?	
1 lower management	16
2 middle management	24
3 senior management	3
Q03 Age?	
1 25 and under	0
2 26-30	1
3 31-35	10
4 36-40	11
5 41-45	11
6 46-50	3
7 51-55	3
8 Over 55	4
Q04 Highest level of education.	
1 High school	7
2 Undergraduate	23
3 Masters Degree\CPA	10
4 doctorate\law	2
5 Other	1
Q05 Major field of highest degree.	
1 Accounting/Finance	8
2 Public Administration	2
3 Political Science\Law	4
4 Economics	0
5 Sociology/Psychology	4
6 Other Social Sciences	4
7 Math, Sciences, or Technical Fields	14
8 Education\Humanities	2
9 College Prep or Other	5

TABLE 5.3
Background Questions and Frequency Responses

Question/statement	Response
Q06 Years in current profession (all jobs).	
1 less than 1 year	2
2 1-5	3
3 6-10	12
4 11-15	6
5 16-20	9
6 21-25	9
7 26-30	1
8 Over 30	1
Q07 Area of employment.	
1 Executive Director, legal, Corporate Services	7
2 Finance	9
3 Transit Operations	8
4 Planning, Engineering, Construction	8
5 Human Resources	7
6 Marketing and Business Development	4
Career Perspectives:	
RESPONSES: 1 - Strongly Disagree 2 - Disagree 3 - Not Sure 4 - Agree 5 - Strongly Agree	
Q08 I will receive at least one promotion within the next 5 years.	
1 - Strongly Disagree	5
2 - Disagree	3
3 - Not Sure	13
4 - Agree	17
5 - Strongly Agree	5
Q09 I will be in the same job 5 years from now.	
1 - Strongly Disagree	6
2 - Disagree	13
3 - Not Sure	16
4 - Agree	5
5 - Strongly Agree	3

TABLE 5.3
Background Questions and Frequency Responses

Question/statement	Response
Q10 My organization will have more employees in 5 years.	
1 - Strongly Disagree	2
2 - Disagree	7
3 - Not Sure	4
4 - Agree	23
5 - Strongly Agree	7
Q11 I expect to be at a senior level when I retire.	
1 - Strongly Disagree	1
2 - Disagree	7
3 - Not Sure	9
4 - Agree	13
5 - Strongly Agree	13
Q12 I would prefer to work in the private sector.	
1 - Strongly Disagree	1
2 - Disagree	18
3 - Not Sure	16
4 - Agree	7
5 - Strongly Agree	1

Niskanen bureaucrat would have a negative view. By gathering information on these events, we obtained institution-specific information to improve control over institutional factors of future experiments. This meets with our requirement that we maintain consistency in our experiment and results. These institutional events are discussed in detail below.

The initial part of the experiment asked respondents for background information. Responses are shown in Table 5.3. Some questions were asked as nonthreatening questions familiar to respondents. Question Q01 (Are you married?) is an example. Other questions were asked to identify various exogenous factors which affect responses.

These were Q02, asking rank; Q04, asking education; Q05, asking academic major; Q06, asking experience; and Q07, asking area of employment in the organization. In addition, we asked for responses to a set of opinion statements on career perspectives. These background questions and career perspective statements allow us to filter responses according to various theories and to have data available to test other theories. For example, rank is a filter used to separate responses by rank and test Dunleavy's theory. The three theories do not explicitly use Education (Q04) as a factor, but it was seen as a potential explanatory variable and thus included. Education may represent a certain level of sophistication and awareness of social theories that would lead to different preferences.

Some of the responses need more explanation. Question Q02, (What is your level in the organization?), reported a distribution of 16 lower management, 24 middle management, and 3 upper management respondents. One problem we faced was the lack of a list of supervisor ranks before we could do the survey, so we restricted the breakdown to three categories. The three responses are divisional directors from the divisions listed under area of employment. The remainder saw themselves as either middle or lower management. This should not pose a problem as more organizations are surveyed and more senior managers will participate. Question Q07, (Area of employment.) had well distributed responses, except for Marketing and Business Development. Members of this division were first in taking the survey. A bug in the program resulted in data loss which occurred to a great extent when this group was being surveyed. The bug was corrected and the remaining respondents had no problems. We

do not expect this to be a major problem for our analysis.

Most of the statements (Q08 - Q12) were offered to account for general attitudes toward the organization. They will be used to compare organizations. However, all of the responses indicate a positive attitude toward the organization and working in the public sector. They all seem to feel they have flexibility of movement and upward mobility. These views support the Dunleavy theory, where bureaucrats view their career as mobile both within the bureau and across bureaus.

The remainder of the questionnaire section consisted of a series of preference statements, shown in Appendix A. The questions were designed to reflect the preferences that characterize the three theories described in Chapter 3. The respondents were to select from a range of responses (1-Strongly Disagree, 2-Disagree, 3-Not Sure, 4-Agree, and 5-Strongly Agree) based on the Likert Scale.

The last part of the questionnaire section is a modification of the Likert Scale to account for specific preferences for particular budget categories. Here the responses were 1-Increase, 2-Leave Unchanged, and 3-Decrease. Likert Scales are commonly used in consumer research to discover consumer preferences, using belief statements (See Dillon, Madden, and Firtle, 1987, 321-24). Responses from a series of belief statements reflect a "favorable or unfavorable attitude toward the object in question." In our case, the object is a preference structure defined by each of the theories of bureaucracy. The Likert Scale questionnaire design meets the criteria developed in Chapter 4. The questionnaire design is a choice function which leads to a set of preference orderings that correspond to Sen's 'image' (Sen, 1971, 309 and Chapter 4 of this thesis). The

statements reflect the characteristics of the true preference structure and as a group generate a response set which can be compared to the preference ordering predicted by a particular theory.

Likert Scale types of questionnaires have been used extensively in consumer research and generate statistically valid data on consumer preferences. For that reason, this type was adopted in our experiment.

Results

Given that this is a valid approach, does the information provide us with support for any of the above theories? Our goal is to examine both individual responses as well as for the bureau as a whole. Because we have three theories of bureaucracy to examine, we developed three set of responses, one for each theory of bureaucracy. To accomplish this, we transformed the data into three sets of binary data (0's and 1's). Appendix A describes how each type of bureaucrat would respond to these questions. If the individual's response was the same as the theory's prediction, a one would be assigned. Otherwise, a zero would be assigned. While the respondents were given five choices, we combined the Strongly Disagree with the Disagree and the Strongly agree with the Agree for purposes of the initial experiment. The result of our transformation was a set of binary data for each respondent for each theory. The more zeros assigned to these responses, the more likely the respondent is not a particular type.

By transforming our data to binary form, we have created a set of independent Bernoulli trials. Bernoulli trials look at the number of successes out of a given sample

and follow a Poisson distribution with a mean and variance of np, where n is the sample size and p is the probability of success. In our model, each response has a probability of $p = 1$. The Bernoulli model allows us to apply the DeMoivre-Laplace limit theorem in developing our hypothesis test.[4]

Given the type of bureaucrat, we wish to test the hypothesis

$$H_0: np = 41$$

vs

$$H_1: np \neq 41$$

where $n = 41$ (the number of preference questions) and $p = 1$. Under the DeMoivre-Laplace limit theorem, we should reject the null hypothesis if

$$\frac{y-np}{\sqrt{np}} \leq z_{\alpha/2}$$

where $z_{\alpha/2}$ is the number of standard deviations from the mean of a normal distribution specified by the confidence level α and n is appropriately large.[5] This ratio is a standard normal variable with a mean of zero and a standard deviation of 1. At the 95% level,

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[4] The DeMoivre-Laplace limit theorem is a common theorem discussed in many statistics texts. My procedure is drawn from Larsen and Marx, *An Introduction to Mathematical Statistics and its Applications.* (1986, 294-295).

[5] The sample size must be large enough to satisfy the inequality

$$0<y-2\sqrt{n(y/n)(1-y-n)}<y+2\sqrt{n(y/n)(1-y-n)}<n$$

In only one case does the inequality not hold (Sub 28's Dunleavy responses where $y = 38$). Otherwise the distribution of the test statistic can be adequately approximated by the standard normal (Larsen and Marx, 295).

Table 5.4
Hypothesis Tests of Bureaucracy Theories

Sub	Niskanen		Dunleavy		Meyer	
	y	C value	y	C value	y	C value
1	23	-2.8111	31	-1.5617 *	26	-2.3426
2	23	-2.8111	34	-1.0932 *	31	-1.5617 *
3	26	-2.3426	35	-0.9370 *	27	-2.1864
4	29	-1.8741 *	29	-1.8741 *	24	-2.6550
5	21	-3.1235	31	-1.5617 *	27	-2.1864
6	20	-3.2796	32	-1.4056 *	24	-2.6550
7	20	-3.2796	30	-1.7179 *	26	-2.3426
8	23	-2.8111	27	-2.1864	20	-3.2796
9	22	-2.9673	31	-1.5617 *	23	-2.8111
10	21	-3.1235	32	-1.4056 *	27	-2.1864
11	23	-2.8111	30	-1.7179 *	27	-2.1864
12	22	-2.9673	37	-0.6247 *	28	-2.0303
13	24	-2.6550	30	-1.7179 *	28	-2.0303
14	23	-2.8111	26	-2.3426	25	-2.4988
15	25	-2.4988	36	-0.7809 *	31	-1.5617 *
16	20	-3.2796	33	-1.2494 *	28	-2.0303
17	16	-3.9043	27	-2.1864	24	-2.6550
18	21	-3.1235	26	-2.3426	28	-2.0303
19	19	-3.4358	31	-1.5617 *	28	-2.0303
20	26	-2.3426	34	-1.0932 *	27	-2.1864
21	30	-1.7179 *	33	-1.2494 *	32	-1.4056 *
22	25	-2.4988	34	-1.0932 *	26	-2.3426
23	22	-2.9673	30	-1.7179 *	23	-2.8111
'24	23	-2.8111	26	-2.3426	23	-2.8111
25	26	-2.3426	32	-1.4056 *	31	-1.5617 *
26	19	-3.4358	30	-1.7179 *	24	-2.6550
27	22	-2.9673	29	-1.8741 *	24	-2.6550
28	27	-2.1864	38	-0.4685 *	33	-1.2494 *
29	16	-3.9043	28	-2.0303	27	-2.1864
30	22	-2.9673	34	-1.0932 *	25	-2.4988
31	26	-2.3426	29	-1.8741 *	27	-2.1864
32	25	-2.4988	34	-1.0932 *	30	-1.7179 *
33	23	-2.8111	27	-2.1864 *	23	-2.8111
34	22	-2.9673	36	-0.7809 *	29	-1.8741 *
35	24	-2.6550	37	-0.6247 *	28	-2.0303
36	27	-2.1864	33	-1.2494 *	27	-2.1864
37	27	-2.1864	35	-0.9370 *	29	-1.8741 *
38	21	-3.1235	34	-1.0932 *	30	-1.7179 *
39	23	-2.8111	32	-1.4056 *	29	-1.8741 *
40	26	-2.3426	31	-1.5617 *	30	-1.7179 *
41	23	-2.8111	32	-1.4056 *	31	-1.5617 *
42	24	-2.6550	33	-1.2494 *	28	-2.0303
43	23	-2.8111	34	-1.0932 *	29	-1.8741 *
n	41					

* indicates significant value.

$-z_{\alpha/2} = -1.96$. Each of the theories were tested and the critical values (C-value) are given in Table 5.4. Those C-values which are more negative than -1.96 reject the null hypothesis that the responses are consistent with the chosen theory. The responses are significantly different from the expected response. Results that support the null hypothesis are noted with an asterisk.

With a few exceptions, the results support the Dunleavy theory. In cases where more than one C-value per respondent is within the critical range, the Dunleavy C-value is lower, except for subject four. There are three possible explanations for our results. First, the Dunleavy theory holds. The Niskanen model is weakest since the assumptions he makes are too simplistic. Many of the responses do not reflect the self-interested character of the Niskanen bureaucrat. Under Niskanen, rank is not a determinant, so there should be no difference in responses. However, the evidence strongly supports rank as a factor. The responses also suggest some Meyer characteristics may be a factor, but while demand for control is an essential part of the Meyer bureaucrat's preferences, many respondents seem to view control functions negatively, lessening support for Meyer.

Second, not enough data has been collected. However, given the DeMoivre-Laplace theorem's criteria for sample size, we have enough data. Of course, more data is always better, but the cost makes its collection difficult. More data could have come either from more subjects or more statements per respondent. Since we had a limited amount of time, neither solution was feasible in this initial experiment.

Table 5.5
Regression Analysis of Preference Responses

	Attribute						
Stmnt	**Rank**	**Educatn**	**Major**	**Exper**	**Function**	**R Sqrd**	**F Value**
Q13	1 2238 (4 32) *	0 3511 (2 07)	0 1190 (2 17)	0 1133 (1 05)	-0 0279 (-0 27)	0 9389	116 81
Q14	0 1353 (0 49)	0 4575 (2 79)	0 0439 (0 83)	0 1803 (1 72) *	-0 0033 (-0 03)	0 8450	41 45
Q15	0 1340 (0 36)	0 3381 (1 51)	0 2118 (2 92)	0 1787 (1 24)	0 1455 (1 07)	0 8651	48 74
Q16	0 3011 (0 81)	0 3287 (1 48)	0 0497 (0 69)	0 3546 (2 50) *	0 1133 (0 84)	0 8712	51 43
Q17	0 4287 (1 63)	0 6786 (4 31)	0 1929 (3 78) *	0 1974 (1 96)	0 0405 (0 42)	0 9543	158 63
Q18	0 8938 (2 58)	0 3471 (1 68)	0 1865 (2 79)	0 1690 (1 28)	0 1113 (0 89)	0 9280	97 98
Q19	0 2264 (0 73)	0 0860 (0 47)	0 1294 (2 17)	0 2452 (2 08)	0 3414 (3 06)	0 9097	76 55
Q20	0 7487 (2 35)	0 2598 (1 36)	0 0398 (0 65)	0 1750 (1 44)	0 0558 (0 48)	0 8775	54 47
Q21	1 2834 (3 75) *	0 3451 (1 69)	0 0605 (0 91)	0 1087 (0 83)	-0 0506 (-0 41)	0 8999	68 36
Q22	0 2747 (0 71)	0 5938 (2 56) **	0 1770 (2 36) *	0 0270 (0 18)	0 1720 (1 22)	0 8623	47 59
Q23	0 5415 (2 00)	0 3371 (2 08)	0 1160 (2 21)	0 1160 (1 12)	0 0318 (0 03)	0 9014	69 48
Q24	-0 2684 (-0 67)	0 2036 (0 85)	0 1348 (1 75) *	0 3488 (2 29)	0 2579 (1 78)	0 8263	36 15
Q25	-0 1671 (-0 56)	0 3996 (2 23)	0 1276 (2 20) *	0 2294 (2 00)	-0 0097 (-0 09)	0 8198	34 57
Q26	0 5372 (1 80)	0 3091 (1 73) *	0 1762 (3 05)	-0 0677 (-0 59)	0 0766 (0 71)	0 8515	43 59
Q27	0 0807 (0 23)	0 5947 (2 82)	0 1518 (2 22) **	0 2551 (1 89)	0 1361 (1 06)	0 9035	71 15
Q28	0 7024 (1 68) *	0 1637 (0 66)	0 1990 (2 47) *	0 1242 (0 78)	0 1954 (1 29)	0 8699	50 85
Q29	0 2228 (0 71)	0 0034 (0 02)	0 6330 (1 04)	0 2124 (1 76) **	0 3328 (2 91) **	0 8591	46 34

Table 5.5 (Cont.)
Regression Analysis of Preference Responses

	Attribute						
Stmnt	**Rank**	**Educatn**	**Major**	**Exper**	**Function**	**R Sqrd**	**F Value**
Q30	0 8870 (2 55)	0 4031 (1 94)	0 1072 (1 60)	0 0864 (0 65)	0 2483 (1 97)*	0 9204	87 88
Q31	-0 0961 (-0 26)	0 1952 (0 88)	0 1094 (1 53)	0 4864 (3 43)	0 1681 (1 25)	0 8781	54 74
Q32	0 2906 (0 91)	0 1615 (0 85)	0 1516 (2 46)*	0 2312 (1 90)	0 0583 (0 50)	0 8654	48 85
Q33	-0 1454 (-0 42)	0 6042 (2 90)**	0 0870 (1 29)	0 2297 (1 72)**	0 1525 (1 20)	0 8607	46 97
Q34	0 0025 (0 01)	0 3154 (1 32)	0 1780 (2 30)	0 3342 (2 18)	0 0267 (0 18)	0 8357	38 67
Q35	0 5275 (2 16)	0 4665 (3 20)	0 1174 (2 49)	0 1905 (2 04)	0 1482 (1 67)	0 9525	152 66
Q36	0 0162 (0 05)	0 0884 (0 48)	0 0562 (0 94)	0 3516 (2 99)	0 1185 (1 06)	0 8340	38 21
Q37	0 3981 (1 23)	0 4009 (2 07)	0 1893 (3 02)	0 2032 (1 64)	0 1526 (1 30)	0 9226	90 67
Q38	-0 2070 (-0 60)	0 3515 (1 72)	0 1612 (2 43)	0 3139 (2 40)	0 2147 (1 73)	0 8848	58 37
Q39	0 5275 (2 51)**	0 1103 (0 88)	0 0335 (0 82)	0 0161 (0 20)	0 1229 (1 61)	0 8556	45 03
Q40	0 2111 (1 08)	0 1623 (1 39)	0 0393 (1 04)	0 0954 (1 27)	0 1335 (1 88)*	0 8686	50 24
Q41	-0 0145 (-0 09)	0 2326 (2 49)	0 0337 (1 12)	0 0676 (1 13)	0 0756 (1 34)	0 8295	36 97
Q42	0 0042 (0 03)	-0 0820 (-0 91)	0 0353 (1 22)	0 2155 (3 75)	0 0839 (1 54)	0 8443	41 22
Q43	0 1438 (0 87)	0 2558 (2 60)*	0 0890 (2 79)*	0 0750 (1 19)	0 0905 (1 51)	0 9147	81 53
Q44	0 1260 (0 88)	0 2752 (3 22)*	0 0634 (2 30)	0 0338 (0 64)	-0 0401 (-0 78)	0 8480	42 40
Q45	0 4673 (3 42)	0 1078 (1 32)	0 0163 (0 62)	0 0003 (0 01)	0 0546 (1 10)	0 8820	56 79
Q46	0 2153 (1 26)	0 2180 (2 14)*	-0 0042 (-0 13)	0 0640 (0 98)	0 0594 (0 96)	0 8255	35 95

Table 5.5 (Cont.)
Regression Analysis of Preference Responses

	Attribute						
Stmnt	**Rank**	**Educatn**	**Major**	**Exper**	**Function**	**R Sqrd**	**F Value**
Q47	0 2010	0 2583	0 0010	0 0830	0 1353	0 8871	59 71
	(1 15)	(2 47)*	(0 03)	(1 24)	(2 13)*		
Q48	0 0613	0 3098	0 1175	0 0144	0 0510	0 8683	50 11
	(0 33)	(2 83)*	(3 31)*	(0 21)	(0 77)		
Q49	0 2458	0 2248	0 0758	0 0555	0 0794	0 8476	42 26
	(1 12)	(1 72)**	(1 79)*	(0 66)	(1 00)		
Q50	0 4363	0 3810	0 0601	-0 0573	0 1031	0 9196	86 93
	(2 57)*	(3 76)*	(1 83)**	(-0 88)	(1 68)**		
Q51	0 6366	0 2765	0 0459	-0 0155	-0 0834	0 8239	35 55
	(2 97)*	(2 16)	(1 11)	(-0 19)	(-1 07)		
Q52	0 2667	0 1471	0 0774	0 0123	0 0345	0 8146	33 40
	(1 45)	(1 34)	(2 17)	(0 18)	(0 52)		
Q53	0 3680	0 2580	0 0534	0 0142	0 0029	0 8321	37 66
	(1 85)	(2 17)*	(1 39)	(0 19)	(0 04)		

Changes in the Budget Categories from Original Distribution

	Attribute						
Cat.	**Rank**	**Educatn**	**Major**	**Exper**	**Function**	**R Sqrd**	**F Value**
AA11	78 57	8 30	-6 67	-12 13	-8 04	0 1633	1 48
	(2 00)**	(0 35)	(-0 88)	(-0 81)	(-0 56)		
AA12	-2580 01	-2440 01	-718 93	-710 77	-733 90	0 9647	207 44
	(-2 49)	(-3 94)	(-3 59)	(-1 80)*	(-1 96)		
AA13	514 80	-29 88	6 87	-153 97	-67 79	0 1484	1 32
	(2 43)	(-0 24)	(0 17)	(-1 90)	(-0 88)		
AA14	-187 40	27 36	23 69	29 56	-6 41	0 1189	1 03
	(-1 96)	(0 48)	(1 29)	(0 81)	(0 19)		
AA15	-84 31	-91 14	-15 00	37 38	24 37	0 1622	1 47
	(-0 63)	(-1 14)	(-0 06)	(0 73)	(0 50)		
AA16	-304 89	87 29	4 03	41 45	117 48	0 4381	5 93
	(-2 68)*	(1 28)	(0 18)	(0 95)	(2 85)*		
AA21	121 00	5 90	3 43	-2 40	25 72	0 3462	4 02
	(0 98)	(0 08)	(0 14)	(-0 05)	(0 57)		
AA22	-3071 53	2903 40	-874 60	-760 08	-990 75	0 9638	202 30
	(-2 45)*	(-3 87)*	(-3 60)*	(-1 59)	(-2 18)*		

Table 5.5 (Cont.)
Regression Analysis of Preference Responses

	Attribute						
Cat.	**Rank**	**Educatn**	**Major**	**Exper**	**Function**	**R Sqrd**	**F Value**
AA23	577 31 (1 49)	73 07 (0 32)	41 50 (0 55)	-337 61 (-2 28) *	-190 88 (-1 36)	0 2903	3 11
AA24	-310 45 (-1 85) *	-86 59 (-0 06)	39 50 (1 22)	79 04 (1 23)	79 53 (1 31)	0 1580	1 43
AA25	29 80 (0 15)	-132 77 (-1 10)	-41 47 (-1 06)	13 31 (0 17)	12 81 (0 18)	0 2287	2 25
AA26	-422 09 (-2 49) *	117 87 (1 16)	-15 58 (-0 48)	85 56 (1 32)	254 42 (4 14) *	0 6351	13 23
AA31	5 74 (0 11)	7 08 (0 24)	-8 55 (-0 88)	0 39 (0 02)	12 25 (0 68)	0 0440	0 35
AA32	-1969 53 (-2 29) *	-1951 29 (-3 80)	-585 96 (-3 53) *	-558 35 (-1 70)	-650 99 (-2 09)	0 9624	194 71
AA33	664 78 (2 97) *	-68 20 (-0 51)	3 74 (0 09)	-85 10 (-1 00)	-60 52 (0 75)	0 3407	3 93
AA34	-268 90 (-1 96) *	-34 28 (-0 42)	38 44 (1 45)	-8 60 (-0 16)	56 63 (1 14)	0 2540	2 59
AA35	-238 61 (-1 44)	12 01 (0 12)	-9 33 (-0 29)	11 40 (0 18)	12 40 (0 21)	0 2748	2 88
AA36	-244 12 (-3 34) *	84 17 (1 93) *	-3 15 (-0 22)	25 48 (0 91)	90 79 (3 43) *	0 4967	7 50

* Significant at the 5% level

Finally, the survey statements may not capture the Niskanen and Meyer preferences adequately. This is possible. However, each of the questions were designed to capture preferences related to a particular theory. For example, Q29 (My organization's spending should be more closely monitored.) addresses the Meyer type while Q36 (I would be willing to give up some job satisfaction for more income.) addresses the Dunleavy type. Contrary responses to both support the Niskanen type. One possible direction for research would be to create a control group with subjects

randomly briefed on the theories and see how their responses would differ. Significant differences in responses by the control group would support this explanation.

Do these results carry over to the organization? Table 5.5 shows how the responses perform as a group. Here the information is less clear. Rank is an important factor in determining many of the responses, particularly with the budget allocations. Where the response is significant, only statement Q20 shows the incorrect sign. This supports Dunleavy because the Niskanen and Meyer theories do not specify rank as a factor. Function and experience also affect responses. This supports both the Niskanen and Dunleavy theories. To the Niskanen bureaucrat, learning the political system would make the bureaucrat more attuned to the rent-seeking opportunities as his years of experience increased. He would also seek to allocate funds to his department, so Function would be a factor. The Dunleavy bureaucrat would become more bureau-shaping as his years of experience increase, making experience a factor. Function may also be a factor, particularly for low-level managers, whom Dunleavy feels would be more 'Niskanen-like.'

The respondent's academic major (Major) should be a factor when the type of education is important. This is especially true for the Meyer bureaucrat. The categories 1-Accounting/Finance and 2-Public Administration are low-valued (in the ranking of responses) and these fields train people to use control functions such as auditing, financial administration, and other administrative controls. Therefore, if the demand for control is important, Major will show a negative sign in response to the relevant budget categories, meaning these types prefer higher budgets for financial administration than

the other groups. This is true for Finance where Major is significant.

Overall, the group responses do not conclusively reject Niskanen and Meyer, but neither do they conclusively support them. Also, many of the same factors are relevant to Dunleavy's theory. The presence of Rank gives greater weight to the Dunleavy theory. Combined with the individual responses, the data favors the Dunleavy theory.

Returning to the individual responses, Table 5.6 shows the percentage changes from the base levels, first for the original budget, next for a twenty percent increase, and finally for a twenty percent decrease. Included is the area of employment for the respondent. The Niskanen theory predicts that bureaucrats should favor their department in any reallocation. Dunleavy would predict a reallocation based on bureau-shaping preferences, indicating that a reallocation might not favor one's own department. Meyer predicts that the demand for control would lead to reallocations that favor control functions.

The results do not support Niskanen. Many respondents reallocated away from their area of employment. Meyer is also not supported by the evidence. Finance loses except when the respondent is in the Finance division. One interesting item is that Planning and Marketing are favored, particularly when the budget is increased or decreased. This consistency among respondents favors the Dunleavy interpretation.

Since other factors may contribute to these results, further analysis is required. For example, Marketing received a small increase compared with the other divisions. In general, Transit operations tended to be decreased along with Finance. There may also be institutional factors contributing to the results. For example, the nature of the

Table 5.6

Percentage Change in Budget Allocations from Base Level

		Current Budget					
Sub	**Dept**	**Corporate**	**Finance**	**Transit**	**Planning**	**Hum. Res.**	**Marketing**
1	Corporate	21.74	0.00	0.00	0.00	0.00	-34.25
2	Finance	0.00	0.00	0.00	0.00	0.00	0.00
3	Finance	0.00	13.73	0.00	-4.60	-6.33	0.00
4	Finance	0.00	22.88	0.00	-23.00	3.17	-34.25
5	Finance	0.00	9.15	0.00	-9.20	-6.33	68.49
6	Marketng	0.00	-9.15	-4.04	9.20	6.33	102.74
7	Marketng	-21.74	9.15	-1.62	-23.00	-28.50	513.70
8	Planning	0.00	-18.31	0.00	41.40	-38.00	239.73
9	Transit	0.00	-27.46	0.00	9.20	6.33	68.49
10	Planning	0.00	0.00	-2.43	0.00	0.00	102.74
11	Planning	0.00	-32.04	23.45	-27.60	-47.50	-34.25
12	Finance	86.96	22.88	-10.51	-4.60	3.17	136.99
13	Finance	43.48	22.88	-1.62	0.00	-15.83	0.00
14	Finance	21.74	4.58	-4.85	4.60	6.33	34.25
15	Finance	0.00	0.00	0.81	-4.60	0.00	0.00
16	Finance	0.00	4.58	0.81	0.00	-9.50	34.25
17	Planning	-43.48	-9.15	8.08	-9.20	-34.83	239.73
18	Corporate	-43.48	0.00	0.00	0.00	-31.67	410.96
19	Corporate	65.22	9.15	-5.66	0.00	-15.83	239.73
20	Corporate	43.48	0.00	-0.81	0.00	0.00	-34.25
21	Corporate	0.00	0.00	0.00	0.00	0.00	0.00
22	Corporate	43.48	-9.15	0.00	-9.20	-3.17	102.74
23	Hum. Res	21.74	0.00	-24.25	0.00	31.67	650.68
24	Hum. Res	-21.74	-18.31	-3.23	46.00	-3.17	0.00
25	Hum. Res	65.22	-4.58	-2.43	-4.60	0.00	68.49
26	Hum. Res	0.00	0.00	1.62	-27.60	9.50	34.25
27	Hum Res	0.00	-18.31	3.23	0.00	0.00	0.00
28	Hum.Res.	0.00	-4.58	0.81	-4.60	3.17	0.00
29	Transit	0.00	-4.58	0.81	4.60	-3.17	0.00
30	Transit	0.00	-4.58	0.81	0.00	3.17	-34.25
31	Transit	-34.78	-7.32	-1.29	14.72	2.53	27.40
32	Planning	-21.74	0.00	1.62	4.60	-6.33	0.00
33	Planning	0.00	0.00	-14.55	50.60	0.00	239.73
34	Transit	0.00	0.00	3.23	4.60	-15.83	0.00
35	Transit	0.00	0.00	1.62	-4.60	-3.17	0.00
36	Planning	0.00	0.00	4.85	0.00	-25.33	68.49
37	Marketng	0.00	-9.15	-2.43	-4.60	-3.17	239.73
38	Planning	0.00	0.00	0.00	0.00	0.00	0.00
39	Transit	-21.74	-4.58	11.32	-13.80	-25.33	-34.25
40	Hum. Res	0.00	0.00	-1.62	-13.80	22.17	-68.49
41	Transit	21.74	0.00	8.89	-9.20	-31.67	0.00
42	Corporate	21.74	0.00	0.00	0.00	-3.17	0.00
43	Marketng	130.43	-32.04	-2.43	-41.40	-6.33	513.70

Table 5.6 (Cont.)

Percentage Change in Budget Allocations from Base Level

		20% increase					
Sub	**Dept**	**Corporate**	**Finance**	**Transit**	**Planning**	**Hum. Res.**	**Marketing**
1	Corporate	-92.68	-29.06	-75.85	424.99	-26.80	658.56
2	Finance	-88.86	-82.46	-74.32	374.13	-10.97	1172.26
3	Finance	-88.86	-71.01	-75.17	409.66	-26.80	943.95
4	Finance	-92.68	-82.46	-64.89	374.13	-55.83	1286.42
5	Finance	-81.24	-78.64	-77.87	454.62	-42.63	772.72
6	Marketng	-77.42	-71.01	-83.26	408.62	-13.61	1037.27
7	Marketng	-31.66	-74.83	-77.19	432.66	-53.19	544.41
8	Planning	-62.17	-82.46	-87.97	467.16	18.06	458.79
9	Transit	-81.24	-54.73	-87.97	408.62	-0.41	972.49
10	Planning	-77.42	-74.83	-83.26	439.29	-21.52	866.04
11	Planning	-92.68	-78.64	-88.65	616.65	-50.55	373.17
12	Finance	-73.61	-74.83	-81.05	469.96	-37.35	829.79
13	Finance	-88.86	-36.69	-74.50	389.46	-18.17	687.10
14	Finance	-85.05	-59.57	-80.56	408.62	-29.44	1037.27
15	Finance	-88.86	-71.01	-79.89	459.49	-34.72	886.87
16	Finance	-85.05	-71.01	-79.22	436.49	-18.88	715.64
17	Planning	-62.17	-90.08	-86.63	515.95	-47.91	487.33
18	Corporate	-43.10	-78.64	-83.26	493.99	-32.08	515.87
19	Corporate	-62.17	-51.95	-80.56	381.79	-23.45	801.26
20	Corporate	-92.68	-51.95	-78.54	417.33	-37.35	1029.57
21	Corporate	-88.86	-74.83	-82.58	473.79	-32.08	923.12
22	Corporate	-77.42	-67.20	-81.91	444.16	-32.08	943.95
23	Hum. Res	-16.40	-55.76	-85.28	259.13	21.41	1086.64
24	Hum. Res	-88.86	-51.95	-83.26	359.83	-0.41	1029.57
25	Hum. Res	-81.24	-35.66	-85.95	427.79	-34.72	972.49
26	Hum. Res	-85.05	-59.57	-82.58	408.62	-36.64	1115.18
27	Hum Res	-88.86	-82.46	-87.97	490.16	-29.44	1029.57
28	Hum.Res.	-88.86	-77.61	-85.95	439.29	-24.16	886.87
29	Transit	-88.86	-67.20	-81.91	408.62	-15.53	943.95
30	Transit	-92.68	-59.57	-81.91	412.46	-47.91	1122.89
31	Transit	-85.81	-84.74	-86.36	475.32	-22.92	1023.86
32	Planning	-88.86	-82.46	-84.61	489.12	-16.24	772.72
33	Planning	-62.17	-71.01	-85.28	382.83	-13.61	972.49
34	Transit	-88.86	-78.64	-84.61	463.32	-10.97	858.33
35	Transit	-88.86	-63.39	-84.61	486.32	-39.99	772.72
36	Planning	-81.24	-74.83	-81.91	486.32	-34.72	744.18
37	Marketng	-62.17	-78.64	-83.93	444.16	-39.99	858.33
38	Planning	-88.86	-74.83	-81.91	458.46	-29.44	894.58
39	Transit	-92.68	-81.43	-83.93	515.95	-34.72	772.72
40	Hum. Res	-96.49	-17.62	-85.28	424.99	-42.63	1172.26
41	Transit	-88.86	-71.01	-82.58	523.62	-34.00	572.95
42	Corporate	-88.86	-63.39	-85.28	512.12	-41.92	772.72
43	Marketng	-31.66	-25.25	-87.97	401.99	-53.19	1001.03

Table 5.6 (Cont.)

Percentage Change in Budget Allocations from Base Level

		20% decrease					
Sub	**Dept**	**Corporate**	**Finance**	**Transit**	**Planning**	**Hum. Res.**	**Marketing**
1	Corporate	-89.02	-67.96	-77.92	473.19	-33.74	769.01
2	Finance	-83.30	-73.68	-81.23	473.19	-37.70	952.23
3	Finance	-66.13	-85.13	-82.97	557.83	-41.66	566.95
4	Finance	-89.02	-90.85	-72.87	483.08	-97.07	1294.69
5	Finance	-30.26	-79.41	-82.97	553.69	-53.53	554.97
6	Marketng	-43.25	-73.68	-83.98	425.59	-13.95	1080.65
7	Marketng	59.73	-85.13	-82.24	507.69	-53.53	524.14
8	Planning	-26.09	-85.13	-89.32	467.44	21.68	481.34
9	Transit	-43.25	-73.68	-96.39	519.19	-17.91	909.42
10	Planning	-31.81	-85.13	-82.97	454.34	-25.82	952.23
11	Planning	-83.30	-79.41	-89.04	632.58	-49.57	310.10
12	Finance	-54.69	-79.41	-82.97	484.69	-33.74	940.24
13	Finance	-60.41	-62.24	-80.95	552.08	-61.45	566.95
14	Finance	-48.97	-73.68	-80.95	408.34	-21.87	1209.08
15	Finance	-71.85	-79.41	-81.96	477.33	-33.74	952.23
16	Finance	-43.25	-90.85	-83.98	536.44	-26.93	524.14
17	Planning	38.39	-85.13	-79.94	507.69	-45.61	383.73
18	Corporate	-14.65	-85.13	-82.97	477.33	-33.74	823.80
19	Corporate	13.96	-50.80	-83.98	467.44	-34.85	609.76
20	Corporate	-71.85	-73.68	-78.93	494.58	-45.61	823.80
21	Corporate	-77.57	-79.41	-82.97	473.19	-29.78	983.05
22	Corporate	-54.69	-79.41	-82.24	501.94	-41.66	823.80
23	Hum. Res	88.33	-67.96	-94.09	375.45	-2.07	1453.94
24	Hum. Res	-26.09	-90.85	-86.00	483.08	-13.95	995.03
25	Hum. Res	-43.25	-62.24	-91.06	524.94	-58.60	995.03
26	Hum. Res	-31.81	-79.41	-87.01	563.58	-69.36	823.80
27	Hum Res	-71.85	-73.68	-81.96	488.83	-13.95	566.95
28	Hum.Res.	-3.20	-73.68	-78.93	471.58	-57.49	1037.84
29	Transit	-37.53	-85.13	-88.02	517.58	-25.82	909.42
30	Transit	-20.37	-85.13	-78.93	529.08	-93.11	1123.46
31	Transit	-73.00	-77.12	-83.58	445.14	-17.12	986.47
32	Planning	-76.03	-85.13	-83.25	501.94	-21.87	738.18
33	Planning	25.40	-79.41	-81.96	373.84	-21.87	1251.88
34	Transit	-71.85	-85.13	-81.23	565.19	-49.57	438.53
35	Transit	-48.97	-90.85	-84.99	553.69	-41.66	726.20
36	Planning	-60.41	-79.41	-79.94	494.58	-41.66	738.18
37	Marketng	13.96	-79.41	-81.96	448.59	-29.78	909.42
38	Planning	-60.41	-79.41	-80.95	450.20	-21.87	983.05
39	Transit	-83.30	-90.85	-82.97	557.83	-45.61	652.57
40	Hum. Res	-94.74	-73.68	-86.00	513.44	-42.76	952.23
41	Transit	-83.30	-67.96	-83.98	530.69	-33.74	554.97
42	Corporate	-77.57	-67.96	-79.94	501.94	-45.61	683.39
43	Marketng	31.12	-39.36	-90.05	488.83	-65.41	866.61

mass transportation organizational form may lead to these results. Other theories may be better able to explain the results. As more experiments are conducted, institutional-specific factors will become clearer and the development of other theories to be tested with the data will shed more light.

In general, the results provide strong support for the Dunleavy theory. The responses tend to favor the allocation of resources consistent with an ideal form (a Dunleavy characteristic). Mass transportation has been reshaping itself into a market-sensitive type of organization where there is more responsiveness to customers and a greater emphasis on marketing and service improvements. The responses indicate the managers we surveyed all share this goal of making PAT more responsive to market conditions. They seem to be *bureau-shapers,* as Dunleavy would describe them.

Significant Events

An important part of our research was to gather information on the organization to compare with other organizations within mass transportation and with other types of organizations.. Many institutional events may affect the perspectives of the respondents. For example, Dunleavy bureaucrats tend to have a more positive view of their organization, but layoffs may affect that view. Thus it is important to know about them. Below is a summary of significant events that may have an impact when comparing the PAT data with other transportation organizations.

Organizational:

In 1992, PAT was faced with a strike by the Amalgamated Transit Union (ATU) lasting 28 days. This affected ridership and employee attitudes. There remains a sense of conflict which is only slowly dissipating and affecting both union and non-union workers.

In 1994, a new Legal Services Division was created as a separate division and legal functions from the other divisions were transferred to it.

Just before the survey was conducted, the Director of Human Resources resigned and the functions of the Division were being moved to other divisions. This could affect employee attitudes.

A series of Early Retirement Programs (ERP) were initiated to reduce staff. The effects could be positive (promotional opportunities) or negative (Reduction in size of PAT, limiting opportunities). I hypothesize that it would be favorable for lower management and negative for middle and senior management. On the negative side, many job vacancies created by early retirement are filled based on seniority rather than skill matching. Therefore, middle and senior management finds productivity dropping and the effort to train new staff is more costly than desired.

Capitalization:

PAT is currently planning to construct a new busway to link the downtown area with the new Airport, recently completed. The first stage of the project is expected to be completed in 1997 when reconstruction of the Fort Pitt Bridge begins. The reconstruction will increase demand for the new busway and ridership is estimated to increase 3 percent overall as a result of the busway.

The bus fleet is being updated with 400 new buses. Most of these are replacing older buses more costly to maintain and the rest being used to expand service.

Conclusion

Overall, these responses and their differences across theories support the general hypothesis that this experimental approach can provide valid information on the preferences of bureaucrats. One notable feature of the experiment was the seeming lack of long consideration respondents gave to the questions and the budget-allocation game. Since the respondents had little knowledge of what they would be asked, they tended to give their responses and play the game at a relatively swift pace. Since they had no prior exposure to the survey, biasing responses would require them to take time to consider each statement. That they did not suggests they were responding according to their first impressions.

The respondents' behavior calls to mind the Marwell and Ames experiment (1981) in which only Economics students seemed to be acting as the free-rider hypothesis would predict. The other students were seemingly unaware that they should bias their responses in order to free-ride. Our respondents did not seem to concern themselves with biasing their responses, but with expressing their opinions. This supports the assumption of Epsilon Truthfulness as discussed in Chapter 4.

The theories used here are not meant to be conclusive, but to provide a framework for evaluating the experimental approach. One goal in the actual experiment was to collect data that may be used to test other theories of bureaucracy. The significance of Education in determining the responses suggests that other theories which include education-related characteristics should be developed. However, based on our research, the Dunleavy theory is best supported.

Even the approach itself can be subject to improvement and refinement as more experiments are conducted, particularly with different types of organizations. Still, the results show that a properly constructed experiment can provide statistically valid information on preferences, essential to testing many theories, not simply theories of bureaucracy.

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6. BUREAUCRACY, PREFERENCES, AND OTHER FACTORS

Preferences are important in developing economic theory, but identifying preferences directly has been a difficult task for economists. This is especially true with the public sector, where the nature of public institutions may create incentives to hide preferences. With the demand for publicly provided goods, consumer preferences are important. With the supply of publicly provided goods through bureaucracy, the preferences of the political authority and the bureaucrat are important. Studies of bureaucracy have postulated preferences, but not tested for them. The empirical evidence on bureaucracy has been general, examining governmental spending trends. However, this evidence can be explained by many theories. Identifying the relevant theory lies with identifying the true preferences of the bureaucrat.

The goal of this thesis was to develop an approach which can reveal preferences. We developed an experiment that uses a survey method, and budget allocation game. We examined three theories, identifying the preferences specific to each. Next we developed the *budget game* to solve the preference revelation problem and guide us in designing our experiment. Finally, we designed and executed the experiment. The results supported Dunleavy's theory of *bureau-shaping* bureaucrats.

The Dunleavy Theory

There are three reasons why the Dunleavy theory may be supported. First, Niskanen's theory is too simplistic. He focussed on senior bureaucrats (bureau heads)

and saw outcomes based only on their preferences. Lower-level bureaucrats were not discussed, so how their preferences may differ was not a part of his model. The more complex nature of the actual bureau studied caused too many variations to support Niskanen. Dunleavy accepted part of the Niskanen interpretation, but realized senior bureaucrats were not independent of lower-level bureaucrats, making rank a factor in bureaucratic behavior. Second, Dunleavy incorporated some of the Meyer interpretation of bureaucrats as risk-averse controllers. In Dunleavy's interpretation control was seen as a bureau-shaping function. However, higher-level bureaucrats desire more discretion, desiring less control than Meyer predicted. Finally, Dunleavy did not tie bureaucratic preferences directly to the budget. One reason was the inability of a bureaucrat to control all features of the budget. In addition, there are controls established to limit rent-seeking. The bureaucrat also has flexibility in terms of his career path. Bureaucrats can move about, particularly to other bureaus, and their careers are based on overall performance. Therefore, short-term rent-seeking behavior could threaten long-term goals (e.g. promotion within and without the bureau). Dunleavy saw the budget as a collective good and success for the bureaucrat lay in a cooperative strategy which did not necessarily include increasing the budget.

Returning to chapter 2, the model of the bureau we developed can be used along with the Dunleavy utility function to analyze how bureaucratic preferences affect the output of the bureau. By changing the parameter ξ_1, the Dunleavy bureaucrat would be more or less inclined to increase the budget. By affecting the parameters α, β, η, and γ, (see pages 37-38) the bureaucrat's behavior can have different effects on output and

the budget. These parameters are controlled by the incentives and constraints designed by the political authority. Understanding that the bureaucrat is of the Dunleavy type enables the political authority to apply strategies which motivate the bureaucrat through his bureau-shaping preferences.

Expanding the Study to Other Types of Bureaus

Our study involved a mass-transportation agency and results may be specific to that type of bureau. We need to study other types of bureaus in order to draw a more general conclusion. However, this experiment has given us an interesting hypothesis to test in other transportation agencies. Mass transportation has become increasingly sensitive to market conditions. Increasing ridership is more important today as population expands to the suburbs and beyond. In Allegheny County, the new Pittsburgh International Airport promises to increase traffic along the county's southern corridor. Automobile traffic is already congested and the only feasible way to get into the city from the airport is over a steep hill or through two tunnels. Conditions can worsen. The Port Authority of Allegheny County (PAT) is actively planning and marketing mass transportation alternatives with incentives to encourage ridership. This is not an unusual situation, but if other mass transportation agencies demonstrate similar preferences for planning and marketing, then Dunleavy's bureau-shaping theory is supported.

One factor that could be affecting our initial experiment is the market structure of mass transportation. An important characteristic of market structure is that the automobile is a close substitute for mass transportation. This characteristic forces mass

transportation bureaus to compete. As a result, bureaucrats may be forced to behave according to the Dunleavy theory. Everyone in the bureau is aware that the success of the bureau depends on increasing ridership. Therefore, more bureaucrats are likely to support the goals of the bureau and work together to achieve them. They would support spending on marketing and planning, even if it does not directly benefit them.

What about other types of bureaus? Would the lack of a close substitute in the private sector change the characteristics of the bureaucrat? Would bureaucrats have different preferences if there were other differences in institutional characteristics? The answer to these questions lies in addressing two additional hypotheses. The first hypothesis asks if there is a relationship between institutional characteristics and the type of bureaucrat. By identifying preferences through our approach, we can identify the type of bureaucrats that dominates the bureau, then look at various characteristics (such as substitute goods and hierarchical structure) to see if there is a correspondence. If bureaucratic types differ according to institutional characteristics, then preferences may be determined by these characteristics.

The second hypothesis asks whether organizational goals are important to the bureaucrat. Herbert Simon (1991) discusses the concept of an 'organizational economy.' While markets do exist, most behavior takes place within firms, where organization is more important. Motivating members of organizations requires a combination of strategies. For Simon, an important motivator is Loyalty, getting members to identify with the organization's goals. This may be especially true in bureaus where other types of motivators, such as pecuniary rewards and authority, may not be used as easily. By

organizing and motivating bureaucrats through Loyalty, bureaucrats may display less self-interest (Niskanen) or risk-aversion and control-orientation (Meyer). As a result, mass transportation bureaucrats would support the goals of mass transportation, educators support would the goal of public education, and public assistance bureaucrats would support the goals of public assistance. Support for organizational goals is a Dunleavy characteristic.

Other factors may play a role in determining the preferences of bureaucrats at a specific bureau. First, there may be regional differences. For example, the political environment of the South may be different from that of the Northeast. Second, the level of government may be a factor, making for differences in the preferences of state level bureaucrats compared to federal bureaucrats. Finally, the dynamics of the political environment may affect the preferences of bureaucrats. Bureaus facing potential changes, budget cuts for example, may be different from those not facing these changes. Additional research will help to uncover these differences.

Conclusion

This thesis dealt with an initial experiment, but the results suggest additional research would provide greater insight into the nature of bureaucratic behavior by understanding bureaucratic preferences. The theories used in this thesis are not conclusive and additional research may uncover a theory better able to explain bureaucratic behavior. However, the results here demonstrate that preferences can be revealed if a proper approach is developed. Our approach utilized the principles of game

theory and consumer research to develop an experiment and gather preference data. This data supports the Dunleavy theory of bureaucrats as *bureau-shapers*.

Bureaucracy exists in the private sector as well as the public and the preferences of managers affect the performance of the firm. Therefore, any method of revealing preferences can allow us to understand the internal organization of a firm. This approach may provide that method. Ultimately, we hope this approach will expand our understanding of bureaucracy and its economic effects.

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APPENDIX A
Frequency Responses to Attitude and Budget Statements

Attitude based statements

Statement		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q13	Government generally provides valuable public services.	3	1	2	25	12
	All three types would agree.					
Q14	Career opportunities in the public sector are too limited.	5	27	3	8	0
	The Niskanen type would agree since competition for increasingly fewer promotions is costly. *The Dunleavy type would disagree since he sees mobility across organizations as possible.* *The Meyer type would be neutral or disagree since there is opportunity through growth.*					
Q15	Our organization needs to broaden the scope of its responsibilities in mass transportation.	0	14	6	12	11
	The Niskanen type would be neutral or agree since it increases the opportunity for greater rewards. *The Dunleavy type would agree since there is strong support for organizational goals.* *The Meyer type would be neutral or agree as expansion increases control.*					
Q16	Public servants are burdened by too many rules and regulations.	3	11	4	13	12
	The Niskanen type would agree since it reduces discretionary power. *The Dunleavy would disagree if of low rank, but be neutral or agree if rank is middle or senior.* *The Meyer type would be neutral or agree since rules and regulations may improve control.*					
Q17	Giving employees more responsibility improves the organization.	0	1	0	24	18
	Both the Niskanen and Dunleavy types would agree since it improves discretion. *The Meyer type would be neutral or disagree as it may reduce the ability to control.*					

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Statement		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q18	Our country needs to invest more in public transportation.	1	1	1	11	29
	The Niskanen type agrees since it increases potential rewards. *The Dunleavy type agrees since it furthers the goals of the organization.* *The Meyer type would be neutral or agree if it increases control.*					
Q19	My organization tends to be too bureaucratic.	0	12	4	20	7
	The Niskanen type would be neutral or disagree since bureaucratic power increases rewards. *The Dunleavy type would tend to agree since it reduces independent and flexibility.* *The Meyer type would be neutral or disagree depending on potential to control.*					
Q20	My organization needs more staff.	3	16	8	9	7
	If the Niskanen type is of low rank, he would be neutral or disagree since it increases competition for more rewards, otherwise agree. *The Dunleavy type would agree if low rank increasing supervisory opportunities, but be neutral or disagree if middle or senior rank since if increases the budget, costly to advocate.* *The Meyer type would be neutral or agree if in either the Finance or Human Resources divisions since they desire control, but otherwise would be neutral or disagree.*					
Q21	Privatization of public transportation could lead to reduced services.	2	5	10	13	13
	Al three types would agree.					
Q22	We can improve service without increasing costs.	3	6	7	18	9
	The Niskanen type would be neutral or disagree since costs are budget items and potential rewards. *The Dunleavy and Meyer types would be neutral or would agree because of bureau-shaping or the desire to control spending.*					

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Statement		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q23	My organization's budget is well distributed.	1	14	16	10	2
	The Niskanen type would disagree, favoring a redistribution to own department. A low ranked Dunleavy type would disagree for the same reasons as a Niskanen type, but a middle or higher rank would tend to be neutral or agree. The Meyer type would be neutral or agree believing control is effective.					
Q24	Government interferes too much in our daily lives.	1	21	2	8	11
	The Niskanen type would disagree seeing government in a positive light. The Dunleavy type would be neutral or disagree as views are more flexible. The Meyer type would disagree, believing government prevents corruption.					
Q25	My organization spends too much time "watching the pennies."	7	24	4	7	1
	The Niskanen type would agree, desiring more discretion over the budget. The Dunleavy type would disagree if low ranked, but is neutral or agree if higher ranked. The Meyer type would be either neutral or disagree, favoring control.					
Q26	Government is generally efficient in providing public services.	2	25	5	10	1
	The Niskanen type would agree since there is a vested interest in government. The Dunleavy and Meyer types would be more flexible, being neutral to agree.					
Q27	Clearly defined responsibilities and duties is most important to effective operation of our organization.	3	3	3	20	14
	The Niskanen type would disagree, desiring more discretion and flexibility. The Dunleavy type would be neutral to disagree also desiring flexibility. The Meyer type would agree since clearly defined responsibilities offers greater control.					

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Statement		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q28	My department needs more equipment (computers, etc.).	1	9	0	14	19
	The Niskanen type would agree. *The Dunleavy type be neutral to agree, being more flexible.* *The Meyer type would agree seeing more equipment used for control.*					
Q29	My organization's spending should be more closely monitored.	3	17	11	9	3
	The Niskanen type would disagree, disliking controls. *The Dunleavy type would disagree if low ranked, but neutral or agree if middle or higher ranked.* *The Meyer type would agree seeking control.*					
Q30	We need to improve communication within my organization.	0	2	1	20	20
	The Niskanen type would be neutral to disagree, not valuing communication. *The Dunleavy type would agree with this as communication is a bureau-shaping condition.* *The Meyer type would be neutral to agreeing since it can improve control.*					
Q31	Our country is overregulated.	0	13	4	13	13
	The Niskanen type would be neutral or disagree since regulation increases the need for bureaucracy. *The Dunleavy type would be neutral or agree because increased regulation is not bureau-shaping.* *The Meyer type would disagree since regulation represents control.*					
Q32	My organization could use more financial administration.	2	13	15	11	2
	The Niskanen type would disagree since financial administration reduces discretion. *Lower ranked Dunleavy types would be neutral or disagree while middle and senior ranks would be neutral to agree.* *The Meyer type would agree seeking control.*					

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Statement	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q33 Routine work reduces job performance and satisfaction.	1	16	1	24	1
The Niskanen type would be neutral to disagree, viewing job satisfactions in terms of rewards. The low and middle ranked Dunleavy types would be neutral to agree benefiting from flexibility while the senior rank would disagree. The Meyer type would be neutral or disagree, seeing routine as control.					
Q34 There is not enough morality in government.	1	12	9	13	8
The Niskanen and Dunleavy types would be neutral to disagree, having a positive view of government. The Meyer type would be neutral to agree, viewing government as potentially corrupt.					
Q35 Managers can be more effective with increased independence and discretion.	0	1	4	33	5
The Niskanen type would agree, seeing more independence increasing budget gains. The Dunleavy type would be neutral to agree, depending on bureau-shaping conditions. The Meyer type would be neutral to disagree, seeing a potential loss of control.					
Q36 I would be willing to give up some job satisfaction for more income.	6	21	7	7	2
The Niskanen type would agree, valuing rewards. The Dunleavy type would be neutral to agree, valuing job satisfaction. The Meyer type would be neutral to disagree, seeking job satisfaction in control.					
Q37 Public organizations need to improve productivity	2	1	1	27	12
The Niskanen type would be neutral to disagree, seeing potential reduction in discretion. The Dunleavy type would be neutral to agree, viewing productivity as bureau-shaping. The Meyer type would be neutral to agree, viewing increased control as productive.					

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Statement	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Q38 More resources in public organizations should be devoted to cost control.	0	11	7	19	6

The Finance department or Accounting/Finance majors of the Niskanen and Meyer types would agree while the rest would disagree.
The Corporate services and Finance departments of the Dunleavy type would be neutral or agree while the others would be neutral or disagree.

Budget based statements

The Niskanen type always favors an increase or at least leave unchanged. The exception is for control functions which the Niskanen type favors decreasing or at least leaving unchanged.
The Dunleavy type favors increasing or leaving unchanged all categories.
The Meyer type would favor increasing or leaving unchanged all categories except for those not viewed as control oriented such as Q39, Q42, Q49 and Q51.

Category	Increase	Leave Unchanged	Decrease
Q39 Secretarial staff	11	26	6
Q40 Operational staff (Drivers, etc.)	12	26	5

The Niskanen and Meyer types would favor an increase only if they are in the transit division, otherwise they would leave unchanged or decrease, reallocating to discretion or control functions.

Q41 Computer equipment	36	4	3

APPENDIX A (Cont.)
Frequency Responses to Attitude and Budget Statements

Category		Increase	Leave Unchanged	Decrease
Q42	Customer service	34	7	2
	The Niskanen type would favor an increase if in the marketing division, otherwise would leave unchanged or decrease. *The Meyer type would increase if in the marketing department, but decrease otherwise.*			
Q43	Auditing staff	7	31	5
	If the Niskanen type is in Finance, he would increase, otherwise leave unchanged or decrease.			
Q44	Training	36	5	2
Q45	Educational assistance	30	12	1
Q46	Facilities maintenance	30	11	2
Q47	Health and pension benefits	14	25	4
	If the Niskanen type is in Finance, he would increase, otherwise leave unchanged or decrease.			
Q48	Financial controls	17	22	4
Q49	Professional conferences	13	22	8
Q50	Supervisory staff	5	30	8
Q51	Advertisement	21	15	7
Q52	Office equipment	27	14	2
Q53	Managerial salaries	19	21	3

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