Politics and Administration*

Michael M. Ting
Department of Political Science and SIPA
Columbia University
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Abstract

This paper develops a theory of the effectiveness of government programs. In the model, a bureaucrat chooses a mechanism for assigning a good (such as a license, or a benefit payment) to a client of uncertain qualifications. The mechanism uses a means test to verify the client’s eligibility. A politician who values the welfare of a subset of client types exercises oversight by designating the resources available for means testing and the population of clients that can be served. The model makes predictions about the incidence of common administrative pathologies, including inefficient and politicized distribution of resources, program errors, and backlogs. When the politician favors marginally qualified clients, programs will have low per capita spending and high error rates. When the politician favors highly qualified clients, programs have higher per capita spending and lower error rates. In the latter case the bureaucrat may also use discriminatory testing, allowing the politician to “target” favored clients. Such targeted programs have higher budgets and client populations but lower per capita spending and higher error rates.

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1 Introduction

What determines the quality of government administration? In both developing and advanced countries, the ability of the bureaucracy to deliver on stated policy goals is considered a key component of the overall quality of governance. Accordingly, there are today many efforts to measure sub-national, national and cross-national government performance. In the United States, several states and every recent presidential administration have implemented performance measurement initiatives. Internationally, interest groups and non-government organizations have compiled numerous well-known measures of government performance.

A variety of theoretical models potentially complement these measurement efforts. Perhaps the predominant perspective is the classic delegation trade-off between ideology and some (possibly endogenous) capability possessed by the agency. This capability might be policy expertise (e.g., Epstein and O’Halloran 1994, Huber and Shipan 2002), the ability to achieve policy outcomes with precision (Huber and McCarty 2004), or valence (Ting 2011, Hirsch and Shotts 2012). Other work disaggregates the bureaucracy somewhat by focusing on the incentives and abilities of government personnel, particularly in the presence of civil service rules (Horn 1995, Rauch 1995, Gailmard and Patty 2007). Finally, a few models address the effects of bureaucratic structure on the distribution of Type I and Type II errors (Heimann 1997, Carpenter and Ting 2007).

This paper takes a different approach and develops a simple theory of public administration “on the ground.” The rationale is elementary: to date, there have been few efforts at modeling the tangible activities of bureaucrats in a political setting. Beyond modeling basic administrative tasks, the objective is to characterize the outcomes that a political principal can achieve when it has only crude controls over the bureaucracy’s resources and authority.

Several recent examples provide a sense of both the significance of administrative tasks and their political outcomes. First, in 2013, Republican congressmen accused the U.S. Internal Revenue Service (IRS) of targeting the applications of conservative interest groups for denial of Section 501(c)(4) tax-exempt status. The IRS grants this status for groups that it determines to be engaging in “social welfare,” but the agency was under-resourced

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1 The 1993 Government Performance and Results Act requires agencies to state objectives, develop performance metrics, and report performance in a standardized fashion. This law was significantly amended in 2010. The Bush administration developed the Performance Assessment Rating Tool in 2002 (since discontinued) to analyze the execution of individual programs.

relative to its caseload after years of cuts in its enforcement budget. Part of the IRS’s strategy was to scrutinize applications based on simple keyword matches with group names, which were later revealed to have triggered reviews of both liberal and conservative groups. Second, the Department of Justice has made extensive use of prosecutorial discretion to achieve the Obama administration’s social policy goals. In 2012, it implemented the Deferred Action for Childhood Arrivals program, which granted temporary deportation relief to young undocumented immigrants who met certain eligibility criteria. In 2013, it announced that it would avoid bringing charges that invoked mandatory minimum sentences for certain types of non-violent drug offenders. Both programs introduced considerable discretion to previously inflexible policies.

These examples are suggestive of the administrative issues that commonly arise when bureaucrats are tasked to make expert judgments that affect the payoffs of citizens or clients. While the list of such phenomena may be quite long, the following items capture a few of the most widely recognized pathologies.

- Backlogs
- Inflexible service
- Resource constraints
- Politicization
- Frequency and distribution of Type I and Type II errors

Absent from this list is corruption. While corruption certainly ranks among the most important organizational failures, the topic has spawned an extensive literature. More importantly, the perception of bureaucratic failures persists even in wealthy democracies where corruption is considered relatively rare. The model is therefore most applicable to environments where efficiency rather than corruption are the primary concerns about bureaucratic performance.

To address these pathologies, the model starts from four assumptions. First, there is adverse selection: bureaucratic allocation problems arise because it is not clear which clients are most deserving of some benefit. Second, bureaucrats have expertise, both in the sense of discerning the appropriateness of allocations and of establishing procedures governing how allocations are made. Third, bureaucratic resources for using expertise are endogenous. This is the main source of a political principal’s control over the bureaucrat. Fourth, the
principal has political preferences that do not reflect social welfare maximization. A natural approach for this setting is therefore to consider the bureaucrat as a mechanism designer, with a principal who can set a limited number of parameters of the mechanism to suit his interests.

The theory shares a number of features with and is inspired in part by Banerjee’s (1997) seminal article on government corruption. In it, a bureaucrat designs a mechanism or screen to allocate scarce slots to a population of clients with private information about their valuation of a slot. The mechanism includes the bureaucrat’s price to each type, as well as “red tape” that is costly to both the bureaucrat and the client. A politician oversees the bureaucrat by punishing her when a mechanism is found to be improper, for example due to excessively high prices (i.e., bribes). By contrast, my model does not incorporate corruption or any explicit notion of red tape, and instead focuses on the distortions create by politically motivated principals and resource-constrained agents.

More specifically, in the model a large number of clients apply in sequence to a bureaucrat to receive a good. Examples of this good include grants by a welfare agency, indictments by a prosecutor’s office, residency applications by an immigration agency, or research grants from a scientific funding agency. Each client has a private type, which determines both her valuation of the good and the effect of a means test. The test embodies the legal and procedural requirements for receiving the good, and thus the client receives the good if and only if she passes. For some types, a higher level of testing is more likely to produce a passing result. The remaining types are are less likely to pass as testing increases, and may also find testing to be costly. I refer to these sets of types as having increasing and decreasing valuations, respectively. This dichotomy roughly represents a distinction between types that are highly and marginally qualified for the good in question. A bureaucrat administers the allocation of the good by committing to a screen that assigns announced client types to an examination level, subject to a budget constraint. The bureaucrat is motivated by career concerns and therefore wishes to make “correct” allocations. This entails passing types with increasing valuations and failing types with decreasing valuations, weighted by the distribution of types in the population and idiosyncratic preferences.

A political principal oversees this procedure by setting the bureaucrat’s total testing budget and client population. In a separation of powers system such as the U.S., this power corresponds to the division of labor between legislative and executive branches. As

an example, the principal could set a high budget but also low enrollment, thus generating a high average per capita service level and shortages due to a large population of unserved clients. These resource constraints are crude instruments because the principal cannot steer resources toward particular types. However, they do reduce the bureaucrat’s discretion to a choice over the distribution of testing levels across client types. The principal has distributive motivations and wishes to maximize the payoff of one type in society while minimizing overall testing costs.

The model makes several predictions about how the politician and bureaucrat generate trade-offs between coverage and quality of service. A first intuition is that the bureaucrat’s ability to discriminate across types will be highly limited. This follows from a crucial difference between the model here and more standard screening models. In the latter, the screen designer can impose side payments on certain types in order to give incentives for agents to truthfully reveal their information. In the public sector context, these payments can be interpreted either as corruption or bureaucratic “red tape.” Here, the bureaucrat would at a first best solution like to discriminate across types by focusing testing on types whose probability of passage are most sensitive to testing, as well as those for which she has the highest idiosyncratic payoff weights. However, she cannot impose transfers, and so truthful revelation requires that similar types receive similar testing levels. In particular, all types with increasing valuations must be tested at one level, while all types with decreasing valuations must be tested at a level that is no higher. Any other configuration would give an incentive for some client type to misrepresent her type.

The principal’s distributive preferences generate two broad categories of program implementation. First, if his preferred client type has decreasing valuations, then the simple solution is to “starve” the bureaucrat. If the under-resourced bureaucrat is sufficiently likely to approve this client type, then the result is broad service: members of that client type collectively benefit from wide eligibility, maximized acceptance probabilities, and minimized testing costs. This solution creates widespread bureaucratic errors, and is unaffected by the bureaucrat’s preferences. Second, if his preferred client type has increasing valuations, then the principal has an incentive to invest in testing. Programs will then tend to serve fewer clients (i.e., create backlogs), but at a lower error rate. Thus the principal’s preferences generate a basic trade-off between breadth and depth of implementation.

Within the second category of implementation, bureaucratic preferences and the effectiveness of the examination technology generate two distinct subcases. The key condition is whether the bureaucrat is acceptance biased, or prefers rewarding types with increasing
valuations more than depriving types with decreasing valuations. A non-acceptance biased bureaucrat must test all types identically, because incentive compatibility rules out testing types with decreasing valuations at a higher level than those with increasing valuations. This generates high per capita costs and limits the program’s client population. It also severely limits the politician’s ability to “target” his favored group. By contrast, an acceptance biased bureaucrat can discriminate by testing them at a higher level than types with decreasing valuations. This bureaucrat enables some targeting, which the principal exploits by setting a larger budget in order to reach a larger population. Discrimination results in lower per capita spending and in turn causes the bureaucrat to commit more Type I errors, as marginally qualified types (i.e., those with decreasing valuations) become more likely to receive the good. Thus, two somewhat counter-intuitive implications emerge: testing discrimination is associated with higher error rates, and higher budgets are associated with higher populations but lower per capita spending.

The paper joins a number of literatures related to the administration of government policy. As noted, there are models of government corruption and red tape that use a related mechanism design or screening technology (e.g., Laffont and N’Guessan 1999, Guriev 2004, Banerjee, Hanna, and Mullainathan 2012). Baron (2000) and Antic and Iaryczower (2015) develop screening models of ideological oversight, and Gailmard (2009) examines bureaucratic oversight with multiple principals. Finally, a number of other models consider errors by a bureaucrat who assesses client applications (e.g., Prendergast 2003, Leaver 2009).

More generally, theoretical and empirical studies of government quality have focused heavily on corruption (Besley and McLaren 1993, Shleifer and Vishny 1993, Rose-Ackerman 1999, Svensson 2005, Bandiera, Prat, and Valletti 2009). However, a number of prominent empirical papers have used broader notions of administrative quality as either a dependent or independent variable (e.g., Knack and Keefer 1995, La Porta et al. 1999, Rauch and Evans 2000, Krause, Lewis, and Douglas 2006). In the American context, numerous studies have examined the links between administrative quality and political control of the bureaucracy (e.g., Moe 1989, Derthick 1990, Lewis 2008, Moynihan, Herd, and Harvey 2014).

The paper proceeds as follows. The next section describes the model. Section 3 derives the results and discusses some implications. Section 4 develops extensions of the model that explore alternative objectives, minimum or maximum testing standards, and goods that are costly to the principal. Section 5 concludes.
2 Model

The model is a simple mechanism by which bureaucrats allocate a good to clients, under the supervision of a political principal. There are three types of players; a politician or principal, a bureaucrat, and clients or citizens.

There is large population of $N$ potential clients. Each has a private type drawn i.i.d. from the set $\Theta$, where $|\Theta|$ is finite and $|\Theta| \geq 2$. Elements of $\Theta$ satisfy $\theta_1 > 1$ and $\theta_i < \theta_{i+1}$ for all $i$. The type is the valuation that the client places on a good whose allocation is controlled by a bureaucrat. Let $\pi_i$ denote the probability that a client is of type $\theta_i$.

The bureaucrat uses a means test to determine whether to allocate the good to the client. For a given type, the testing level $t \geq 1$ can be interpreted as the per capita effort expended on the test. Testing generates a binary result corresponding to “fail” and “pass,” where $\phi(t; \theta_i)$ is the probability of passage. The good is allocated if and only if the client passes. The probability of passing is either increasing and concave or decreasing and convex, as follows:

$$\phi(t; \theta_i) = \begin{cases} 1 - \frac{1}{c_i t^\alpha} & \text{if } \theta_i \in \Theta^h \\ \frac{1}{c_i t^\alpha} & \text{if } \theta_i \in \Theta^l \end{cases}$$

The sets $\Theta^h$ and $\Theta^l$ partition $\Theta$. In the interesting case of the model both subsets are non-empty, so that different types “disagree” on whether they benefit from more testing. The parameter $\alpha > 0$ is a measure of bureaucratic expertise. Higher values of $\alpha$ will generate larger increases in the probability of acceptance (respectively, rejection) for types in $\Theta^h$ (respectively, $\Theta^l$) for low values of $t$. The parameter $c_i \in [2, \theta_i)$ is another measure of testing testing, with higher values increasing the “default” probability of acceptance (respectively, rejection) at $t = 1$ for types in $\Theta^h$ (respectively, $\Theta^l$). For example, $c_i = 2$ represents the most difficult problem, as all types pass with probability $1/2$ when tested at the minimum level of 1. This functional form usefully eliminates many (but not all) corner solutions. It will be convenient to denote by $I^l = \{i | \theta_i \in \Theta^l\}$ and $I^h = \{i | \theta_i \in \Theta^h\}$ the set of indices in $\Theta^l$ and $\Theta^h$, respectively.

The bureaucrat maximizes the program’s “quality,” or its weighted ability to deliver the proper benefit to each type.\(^4\) Let the weight for type $\theta_i$ be denoted $w_i > 0$. She receives $w_i$ for any client who receives the good when $\theta_i \in \Theta^h$ or for any client who does not receive the good when $\theta_i \in \Theta^l$. Thus $w_i$ serves as a measure for the extent to which the bureaucrat is

\(^4\)Notably, the bureaucrat does not care directly about the number of clients served, the budget or budgetary “slack.” Both the budget and client population are determined prior to the bureaucrat’s actions in the model, and thus the bureaucrat simply designs the best program possible within these constraints.
interested in investigating a type-$\theta_i$ client. Combined with (1), this payoff assumption implicitly represents the bureau’s authority and expertise in designing its screening technology: for “qualified” and “marginal” types (i.e., $\Theta^h$ and $\Theta^l$) it can fashion a testing methodology that make her desired outcome more and less likely, respectively.

The bureaucrat chooses a direct mechanism or screen ($t(\theta_i)$) that treats clients at level $t(\theta_i)$ for a report of type $\theta_i$. Clients “arrive” at the bureaucrat in i.i.d. fashion, and so the probability of a type-$\theta_i$ client is always simply $\pi_i$. Given truthful reporting, the bureaucrat’s objective is then:

$$u_b(t(\theta_1), \ldots, t(\theta_{|\Theta|})) = \sum_{i \in \Theta^h} \pi_i w_i \phi(t(\theta_i); \theta_i) + \sum_{i \in \Theta^l} \pi_i w_i (1 - \phi(t(\theta_i); \theta_i))$$

(2)

The politician specifies a pair $(p, T)$ for the bureaucrat prior to her mechanism choice. The parameter $p$ ($0 \leq p \leq N$) is the size of the population that the bureaucrat is mandated to serve through means tests and allocations. The parameter $T \geq p$ is the bureaucrat’s budget, which constrains the ex ante number of clients the bureaucrat can test, as follows:

$$p \sum_i \pi_i t(\theta_i) \leq T.$$  

(3)

Thus, the bureaucrat’s expected service cost is linear in $p$, and each client “costs” $t(\theta_i)$. Since the bureaucrat’s objective is increasing in all $t(\theta_i)$, this constraint must bind.

Clients care about receiving the good as well as possible testing costs. In particular, testing at a level $i$ imposes a cost $k_i t_i$. I assume that $k_i = 0$ for $\theta_i \in \Theta^h$ and $\theta_i/c_i \geq k_i \geq 0$ for $\theta_i \in \Theta^l$, where the upper bound on $k_i$ ensures that some feasible testing levels do not impose negative utility on the client. While it is certainly conceivable that testing should be costly for all types, this assumption captures the notion that testing will be less costly for types that the bureaucrat wants to pass, perhaps to the point that she will endeavor to make testing costs negligible.

A type-$\theta_i$ client who announces type-$\theta_j$ therefore receives:

$$u_c(\theta_j; \theta_i) = \phi(t(\theta_j); \theta_i) \theta_i - k_i t(\theta_j).$$

(4)

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5The population choice might represent an explicit limit on the bureaucrat’s services, or it may represent the selection of clients based on some observable characteristic that is independent of the type distribution, such as geography.

6As an example, a bureaucrat might choose to qualify applicants for a program simply by using available administrative data, rather than requiring applicants to produce evidence of eligibility. Under the Affordable Care Act, enrollment in state Medicaid programs can (at the state’s discretion) be handled largely through pre-existing data from other public assistance programs. See [http://www.medicaid.gov/medicaid-chip-program-information/program-information/targeted-enrollment-strategies/targeted-enrollment-strategies.html](http://www.medicaid.gov/medicaid-chip-program-information/program-information/targeted-enrollment-strategies/targeted-enrollment-strategies.html).
Finally, the principal wishes to maximize the net surplus of citizens of some type $\theta_j$, but faces a cost of providing resources to the bureaucrat. Given truth-telling under the bureaucrat’s screen, the principal’s objective can be written:

$$u_p(p, T; \theta_j) = \pi_j p [\phi(t(\theta_j); \theta_j) \theta_j - k_j t(\theta_j)] - \frac{b}{2} T^2,$$

where $b > 0$ is a scaling parameter.

3 Results

As is standard, the incentive compatibility (IC) constraints require that each client type $\theta_i$ prefer reporting $\theta_i$ to any $\theta_j \neq \theta_i$:

$$\phi(t(\theta_i); \theta_i) \theta_i - k_i t(\theta_i) \geq \phi(t(\theta_j); \theta_i) \theta_i - k_i t(\theta_j).$$

Additionally each type $\theta_i$ has an individual rationality (IR) constraint:

$$\phi(t(\theta_i); \theta_i) \theta_i - k_i t(\theta_i) \geq 0.$$

The specific interpretation of the IR constraints is that while all potential clients under the population cap are entitled to be considered for the good, any client can choose to fail the exam (e.g., by not showing up) and not receive the good.

Observe that a type-$\theta_i$ client’s report only matters insofar as it affects the bureaucrat’s inspection level. Thus it is helpful to write the client’s expected utility as a function of inspection level $t(\theta_i)$:

$$\hat{u}_c(\theta_i, t(\theta_i)) = \left\{ \begin{array}{ll}
(1 - \frac{1}{c_d(\theta_i) \theta_i}) & \text{if } \theta_i \in \Theta^h \\
\frac{1}{c_d(\theta_i) \theta_i} - k_i t(\theta_i) & \text{if } \theta_i \in \Theta^l
\end{array} \right.$$ (6)

The valuation for type $\theta_i$ is obviously decreasing over $t(\theta_i)$ if and only if $\theta_i \in \Theta^l$. Thus, types in $\Theta^h$ always benefit from greater scrutiny, while types in $\Theta^l$ are hurt by it.

Finally, because the bureaucrat must respect the client’s IR constraint, denote by $t_i^{IR}$ the value of $t(\theta_i)$ at which $\hat{u}_c(\theta_i, t(\theta_i)) = 0$ for $\theta_i \in \Theta^l$. By assumption, $t_i^{IR}$ exists and is unique, and $t_i^{IR} > 1$. Clients with higher valuation will have higher values of $t_i^{IR}$, and hence also will make IR easier for the bureaucrat to satisfy.
3.1 First Best

As is standard, I first derive the bureaucrat’s solution under the assumption that client types are known. For notational simplicity, I hereafter abuse notation slightly and let \( t_i = t(\theta_i) \). The bureaucrat then maximizes her objective (2) subject to her budget constraint (3), taking as given her budget \( T \) and population mandate \( p \). Performing the straightforward constrained optimization problem yields the following relationship between testing levels.

Lemma 1 First Best. Under the first best, at an interior solution the testing levels for types \( \theta_i \) and \( \theta_j \) satisfy:

\[
t^f_j = \left( \frac{c_i w_j}{c_j w_i} \right)^{\frac{1}{1+\alpha}} t^f_i.
\]

Proof. All proofs are in the Appendix.

At an interior solution, the testing level for each type is a fixed proportion of every other inspection level, independent of \( T \) and \( p \). This implies that there is a unique set of testing levels \( \{t^f_i\} \) that satisfy the budget constraint with equality. Corner solutions for inspection levels are also possible. Each \( t^f_i \) is constrained to be at least 1, and to satisfy the IR constraint, \( t^f_i < t^{IR}_i \) must also hold for types in \( \Theta^f \).

The comparative statics on the bureaucrat’s relative inspection level for a given type \( \theta_j \) are mostly intuitive. It is increasing in the bureaucrat’s payoff weight \( w_j \) on that type, and also in the extent to which inspections can change the probability of passage, as measured by \( c_j \). (Recall that these parameters jointly capture the bureaucrat’s incentive to test type \( \theta_j \).) Because there are no fixed costs to inspecting any given type, inspection levels are independent of the distribution of types. Finally, the effect of expertise (\( \alpha \)) is ambiguous: the testing level is increasing in \( \alpha \) if \( w_j \) is low, and decreasing otherwise.

For the principal’s maximization problem, the effects of the budget and population follow directly from Lemma 1 and the fact that the budget constraint binds. Since the ratio between testing levels is independent of \( T \), a change in the budget will simply produce a proportional change in all inspection levels. The effect of \( p \) is simply the inverse of the effect of \( T \). From the principal’s objective (5), it is straightforward to see that a principal who wishes to benefit type \( \theta_j \) will therefore have an incentive to select a large budget and client population if \( \theta_j \in \Theta^h \), \( \pi_j \) is high, and if \( w_j \) is large and \( c_j \) is small.
3.2 Decreasing and Increasing Valuations

To develop some intuition, I begin by examining two extreme cases, where all client types are either in Ω^l or Ω^h. In the former case (i.e., decreasing valuations), each client type’s expected utility ˆu_c(θ_i, t_i) is decreasing in the bureaucrat’s inspection level. In the latter case (i.e., increasing valuations), ˆu_c(θ_i, t_i) is increasing in t_i for all types. These cases might correspond, for example, to the administration of construction permits by an anti-development (respectively, pro-development) municipal buildings department. While such cases are probably uncommon, the results will be useful for developing the main results in the next subsection.

The first result is that a feasible client screen must have a uniform inspection level t^* for all types. Under decreasing valuations, the common inspection level must also be sufficiently low. This follows from straightforward manipulation of the IC and IR constraints.

**Lemma 2** Uniform Testing Under Decreasing and Increasing Valuations. Under decreasing valuations or increasing valuations, t^* = t^* for all θ_i. Under decreasing valuations, t^* ≤ min_i{t^I_R}. □

This result is a consequence of the assumption that the bureaucrat has only one dimension – the level of means testing – to control each type’s payoff. When all types in the population have the same preferences over whether to have more or less testing, all clients would choose an identical testing level – the highest available under increasing valuations, or the lowest available under decreasing valuations. Thus IC can be preserved only by implementing a uniform test. This contrasts with a standard screening framework, where the uninformed player typically has the ability impose different side-payments on different types. If the bureaucrat could impose side payments, then she would be able to test some types at a higher level in exchange for a side payment that precludes other types from claiming that testing level.

Solving for t^* is straightforward. Since there is a common testing level t^* and the budget constraint binds, there is a unique testing level that is feasible and satisfies IC. Substituting into (3), this testing level must satisfy:

\[ t^* = \frac{T}{p}. \]  (8)

This value is the solution to the bureaucrat’s problem under increasing valuations, and if it satisfies IR it is also the solution under decreasing valuations if t^* < min_i{t^I_R} for all i. Otherwise, the corner solution is t^* = min_i{t^I_R}. 

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Compared to the first-best solution, the optimal testing level under decreasing or increasing valuations is not weighted by the importance (to the bureaucrat) of each type. The allocative inefficiency is therefore especially large when the type distribution or the distribution of weights \( w_i \) is highly skewed toward some types.

The principal then chooses a budget and client service level to maximize the surplus of her preferred group, \( j \). Substituting \( t^* \) into her objective yields:

\[
\begin{align*}
    u^*_p(p, T; \theta_j) &= \begin{cases} 
    \pi_j p \left( 1 - \frac{p^{\alpha c_j}}{c_j^{\alpha c_j}} \right) \theta_j - \frac{b}{2} T^2 & \text{if } \theta_j \in \Theta^h \\
    \pi_j p \left[ \frac{p^{\alpha c_j}}{c_j^{\alpha c_j}} \theta_j - k_j \frac{T}{p} \right] - \frac{b}{2} T^2 & \text{if } \theta_j \in \Theta^l
    \end{cases}
\end{align*}
\] (9)

Manipulation of this expression produces the first main result. While the principal’s objective is not always concave, interior solutions as characterized here hold under a broad range of parameters.

**Proposition 1** Budgets and Client Service Under Decreasing and Increasing Valuations.

(i) Under decreasing valuations, \( T^* = p^* = \frac{\pi_j \theta_j}{c_j^{\alpha c_j}} \), and \( t^* = 1 \) at an interior solution.

(ii) Under increasing valuations, \( T^* = \frac{\alpha \pi_j \theta_j c_j^{1/\alpha}}{b(\alpha+1)^{(\alpha+1)/\alpha}} \), \( p^* = \frac{\alpha \pi_j \theta_j c_j^{2/\alpha}}{b(\alpha+1)^{(\alpha+2)/\alpha}} \), and \( t^* = \left( \frac{\alpha+1}{c_j} \right)^{1/\alpha} \) at an interior solution.

Under decreasing valuations, the principal’s problem is simple: members of her preferred group benefit from broad implementation (i.e., high \( p \)), and low testing (i.e., low \( t \)). These goals are simultaneously achieved by minimizing the budget for any given population, and thus \( T^* = p^* \) and \( t^* = 1 \). What remains is a simple univariate, concave objective. Under increasing valuations, higher testing levels help clients, but are also costly and reduce the population that can be served.

The comparative statics for \( T^* \) and \( p^* \) under increasing valuations are identical. Both are increasing in \( \theta_j \), as this mechanically increases the surplus enjoyed by the politician’s favored clients. They are also increasing in the default probability of acceptance (through the parameter \( c_i \)), as this reduces the losses from clients who are inspected but do not receive the allocation, and the proportion of \( \pi_j \) of favored types in the population. The role of \( \alpha \) is ambiguous: \( T^* \) and \( p^* \) are decreasing in \( \alpha \) for low values of \( \alpha \), but possibly increasing for higher values. Finally, the testing level \( t^* \) is decreasing in \( c_i \), which dampens the potential impact of testing, but the effect of \( \alpha \) is again ambiguous.

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7 An interior solution for \( p^* \) is guaranteed for \( N \) sufficiently large.
3.3 Mixed Valuations

Now consider the case where both $\Theta^h$ and $\Theta^l$ are non-empty. This case is more plausible than those in the previous section, since the bureaucrat desires opposite outcomes for different types of clients.

The first result shows that the logic of Lemma 2 still applies: the set of types with increasing and decreasing valuations must still be tested at the same level. Somewhat more interestingly, these levels might be different, with the high types receiving the higher level of testing.

**Lemma 3** Uniform Testing Under Mixed Valuations. *Under mixed valuations, $t^* \leq \min \{t^R \} \text{ for all } \theta_i \in \Theta^l, t^* = t^{hr} \text{ for all } \theta_i \in \Theta^h, \text{ and } t^* \leq t^{hr}$. □*

Lemma 3 implies that there can be at most two levels of testing across the entire client population. A second testing level can exist because more testing attracts types in $\Theta^h$ but deters those in $\Theta^l$. Thus types that the bureaucrat would like to pass can be given higher levels of testing. Unfortunately it is not necessarily the case that the bureaucrat would want to do so; under the first best she may actually wish to test types in $\Theta^l$ more heavily, but this would violate IC.

To characterize testing levels, it is useful to begin by deriving a version of the first best that recognizes the constraints of Lemma 3. In other words, all types in $\Theta^l$ are tested at one level and all types in $\Theta^h$ are tested at another. If the derived $\Theta^h$ testing level is greater than the $\Theta^l$ testing level, then IC is satisfied. If instead the bureaucrat would prefer to test $\Theta^l$ types at a higher level, then it can be shown that the optimal testing profile satisfying IC must be the “uniform” standard $T/p$ used for decreasing or increasing valuations. In both cases, the screening mechanism is implementable if the testing levels are feasible (i.e., at least 1) and satisfy IR.

As intuition might suggest, the bureaucrat will want to test qualified types at a higher level when her payoff weights ($w_i$) on types in $\Theta^h$ and the potential gain from testing for those types (i.e., low $c_i$) are sufficiently high. This can be loosely interpreted as higher agreement on the treatment of different types between the principal and the bureaucrat. The required condition is formally defined as follows.

**Definition 1** Acceptance Bias. *The bureaucrat is acceptance biased if:*

$$\frac{\sum_{i \in I^h} \pi_i}{\sum_{i \in I} \pi_i} < \frac{\sum_{i \in I^h} \frac{\pi_i\mu_i}{c_i}}{\sum_{i \in I^l} \frac{\pi_i\mu_i}{c_i}}.$$ 

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The next result then characterizes the optimal implementable screening mechanisms.

**Proposition 2** Testing Under Mixed Valuations. Under mixed valuations, at an interior solution:

(i) If the bureaucrat is acceptance biased, then \( t^* < t^h \), where:

\[
 t^* = \frac{T}{p - p \left( 1 - \left( \frac{\sum_{i \in I^h} \pi_i}{\sum_{i \in I^l} \pi_i} \right) \sum_{i \in I^h} \pi_i \right)^{1+\alpha}} \sum_{i \in I^h} \pi_i 
\]

(ii) If the bureaucrat is not acceptance biased, then \( t^* = t^h = T/p \).

Proposition 2 shows that acceptance bias plays a central role in program implementation. With it, discrimination is possible and \( t^h > T/p \) and \( t^* < T/p \); that is, the bureaucrat over-tests types in \( \Theta^h \) relative to the uniform benchmark, and under-tests types in \( \Theta^l \). Without it, discrimination is impossible and the politician’s ability to deliver targeted benefits is highly constrained.

For any given \( p \) and \( T \), the screening mechanism is most inefficient for the bureaucrat when she wishes to test types in \( \Theta^l \) more heavily. That is, when the bureaucrat is not acceptance biased, she is both more interested in rejecting marginal types than accepting qualified ones, and faces relatively high returns to testing for marginal types. The resulting constraint on equal treatment implies that, relative to her optimum, the bureaucrat will make more allocation errors on types in \( \Theta^l \) and less on types in \( \Theta^h \).

The principal’s maximization problem then breaks down into three cases, depending on the kind of group she favors and whether the bureaucrat is acceptance biased. A key observation is that in two cases, her problem is essentially identical to her problem in the simple decreasing or increasing valuations world. First, when \( \theta_j \in \Theta^l \), she again maximizes her clients’ probability of acceptance by minimizing the bureaucrat’s resources and inflating the client population if type \( \theta_j \) clients are likely to be approved. Second, when \( \theta_j \in \Theta^h \) and the bureaucrat is not acceptance biased, testing must be uniform and her objective is given by (9). Proposition 1 describes these cases.

In the final case, \( \theta_j \in \Theta^h \) and acceptance bias makes some testing discrimination possible. Notationally, define the following term, which is simply the ratio between (8) and (12), or
the testing levels for high types under increasing valuations and under mixed valuations:

\[ m = 1 - \left( 1 - \left[ \left( \sum_{i \in I_H} \pi_i \right) \sum_{i \in I} \frac{\pi_i w_i}{c_i} \right]^{1+\alpha} \right) \sum_{i \in I} \pi_i \] (13)

Analogously, define the following ratio between (8) and (11), or the testing levels for low types under increasing valuations and under mixed valuations:

\[ \overline{m} = 1 - \left( 1 - \left[ \left( \sum_{i \in I_L} \pi_i \right) \sum_{i \in I} \frac{\pi_i w_i}{c_i} \right]^{1+\alpha} \right) \sum_{i \in I} \pi_i \] (14)

By manipulating (10), it is easily shown that acceptance bias implies that \( m < 1 \) and \( m > 1 \). This allows the principal’s objective to be written to reflect type \( \theta_j \)’s higher level of testing as follows.

\[
u^*_p(p, T; \theta_j) = \pi_j p \left( 1 - \frac{p^{\alpha \overline{m}^\alpha}}{c_j^{1/\alpha}} \right) \theta_j - \frac{b}{2} T^2\] (15)

Combined with the preceding observations, maximizing (15) produces the following result on budgets and client service under mixed valuations.

**Proposition 3** Budgets and Client Service Under Mixed Valuations. If \( \theta_j \in \Theta^l \), then \( T^* = p^* = \frac{\pi_j \theta_j}{c_j} \), and \( t^* = 1 \). If \( \theta_j \in \Theta^h \), then at an interior solution:

\[
T^* = \begin{cases} 
\frac{\alpha \pi_j \theta_j c_j^{1/\alpha}}{b m (\alpha + 1)^{(\alpha + 1)/\alpha}} & \text{if (10) holds} \\
\frac{\alpha \pi_j \theta_j c_j^{1/\alpha}}{b (\alpha + 1)^{(\alpha + 1)/\alpha}} & \text{if (10) does not hold,}
\end{cases}
\]

\[
p^* = \begin{cases} 
\frac{\alpha \pi_j \theta_j c_j^{2/\alpha}}{b m^2 (\alpha + 1)^{(\alpha + 2)/\alpha}} & \text{if (10) holds} \\
\frac{\alpha \pi_j \theta_j c_j^{2/\alpha}}{b (\alpha + 1)^{(\alpha + 2)/\alpha}} & \text{if (10) does not hold,}
\end{cases}
\]

\[
t^h* = \left( \frac{\alpha + 1}{c_j} \right)^{1/\alpha}
\]

\[
t^l* = \begin{cases} 
\left( \pi m c_j \right)^{1/\alpha} & \text{if (10) holds} \\
\left( \frac{\pi + 1}{c_j} \right)^{1/\alpha} & \text{if (10) does not hold.}
\end{cases}
\]

Proposition 3 identifies three program implementation styles – one for \( \theta_j \in \Theta^l \) and two for \( \theta_j \in \Theta^h \) – that correspond neatly to different profiles of politician and bureaucrat preferences.
When the principal’s favored group is marginal, the model predicts that the program will be more error-prone than when it is qualified. If a marginal favored group has a sufficiently high probability of acceptance (i.e., low $c_j$), then its budget and client population will actually be larger than when the favored group is qualified. The program is therefore designed to serve the politician’s favored group, but without any meaningful “targeting” on the part of the bureaucrat.

If a favored group is qualified, bureaucratic acceptance bias (i.e., whether (10) holds) results in implementation flexibility, a larger budget, and a larger client population, but also a lower testing level for types in $\Theta^l$. Without acceptance bias, there is again little meaningful targeting of benefits, as all clients receive either no service (if there is a backlog) or uniform treatment. With acceptance bias, the politician is able to achieve a measure of favorable treatment for his preferred clients. Notably, the testing level for types in $\Theta^h$ does not depend on acceptance bias, and is identical to that of the basic increasing valuations case. This implies that the acceptance probability for members of a favored qualified group in all versions of the model is $\alpha/(\alpha + 1)$, which is obviously increasing in the bureaucrat’s expertise. It also implies that all cuts in per capita spending fall exclusively on marginal types. Figure 1 illustrates these relationships for a qualified favored type.

3.4 Implications

3.4.1 Program Outcomes

Beyond the basic characterization of program implementation generated by the politician’s preferences and the bureaucrat’s acceptance bias, Proposition 3 implies some basic comparative statics relationships on key measures of program performance. These measures are directly related to all of the administrative pathologies identified in the introduction except possibly for politicization, which is addressed in the following subsection. The outputs are as follows:

- **Client population**, measured by $p$, where $p < N$ implies a shortage or backlog.
- **Flexibility**, measured by whether $t^l < t^h$.
- **Budget** received by the agent, measured by $T$.
- **Per capita budget**, measured by $T/p$.
- **Type I error avoidance rate**, measured by $1 - \phi(t_i; \theta_i)$ for $\theta_i \in \Theta^l$. 

16
Figure 1: Equilibrium Budgets, Client Population, Per Capita Spending, and Acceptance Probabilities with a Qualified Favored Type. Here $\Theta^l = \{\theta_1\}$, $\Theta^h = \{\theta_2\}$, $\theta_2 = 10$, $w_1 = 1$, $\alpha = 3$, $c_1 = c_2 = 2$, $b = .001$, $\pi_1 = 0.8$, and $\pi_2 = 0.2$. Bias acceptance then holds for $w_2 > w_1$. The figure plots the total budget $T^*$ (top left), client population $p^*$ (top right), per capita spending (bottom left), and acceptance probabilities for each type (bottom right), as a function of $w_2$. Note that the acceptance probability for type $\theta_1$ is increasing because testing levels are decreasing.
• Type II error avoidance rate, measured by \( \phi(t_i; \theta_i) \) for \( \theta_i \in \Theta^h \).

Note that Type I errors are defined as approvals of the good to types in \( \Theta^l \) (e.g., approving a bad drug), while Type II errors are denials of the good to types in \( \Theta^h \) (e.g., rejecting a good drug). The errors therefore reflect the bureaucrat’s preferences over approving different types. Both types of errors are conditional upon participation in the bureaucrat’s mechanism, and therefore do not count Type II errors arising from failure to serve eligible clients.

There are two sets of results, summarized by Comments [1] and [2]. The first comment describes performance parameters in the case where the principal favors a marginal type (i.e., \( \theta^j \in \Theta^l \)). It also compares the equilibrium parameters to the case where the principal favors a qualified type. The result follows from the fact that when her favored type is marginal, the principal aims for high participation but with minimal per capita testing resources. The result is stated without proof.

Comment 1 Favored Marginal Types. Let \( \theta_j \in \Theta^l \) be the principal’s favored type. (i) All performance measures are independent of all \( w_i \).

(ii) The budget and client population are weakly increasing in \( \pi_j \) and weakly decreasing in \( b \) and \( c_j \).

(iii) There is no flexibility; per capita budgets and error avoidance rates are constant in all parameters.

(iv) The per capita budget, Type I and II error avoidance rates, and flexibility are (weakly) lower than when \( \theta^j \in \Theta^h \). The budget and client population are higher than when \( \theta^j \in \Theta^h \) if \( c_j \) is sufficiently low.

Part (i) of the result implies that when a marginal group is favored, the bureaucrat’s preferences are irrelevant. Thus, replacing the bureaucrat can be effective only when a qualified group is favored. Part (ii) implies that the principal benefits from reductions in \( b \) and \( c_j \). A reduction in \( b \) generates a positive budget shock that boosts both total spending and the client population, while a reduction in \( c_j \) increases the probability that a marginal type \( \theta_j \) passes. Finally, as part (iv) shows, testing inaccuracies create a stark trade-off: sufficiently small values of \( c_j \) will maximize program spending and coverage, albeit at very high error rates.

The next comment describes the case of a principal who favors a qualified group. Here, changes in the testing technology and the bureaucrat’s preferences affect all of the observable performance measures. Note that where applicable, the results accounts for whether acceptance bias \([10]\) holds.
Comment 2 Favoring Qualified Types. Let $\theta_j \in \Theta^h$ be the principal’s favored type. (i) The budget and client population are weakly increasing in $w_i$ for $\theta_i \in \Theta^h$ and $c_i$ for $\theta_i \in \Theta^l$, and weakly decreasing in $w_i$ for $\theta_i \in \Theta^l$ and $c_i$ for $\theta_i \in \Theta^h$ and $\theta_i \neq \theta_j$. They are decreasing in $b$.

(ii) The per capita budget is weakly decreasing in $w_i$ for $\theta_i \in \Theta^h$ and $c_i$ for $\theta_i \in \Theta^l$, and weakly increasing in $w_i$ for $\theta_i \in \Theta^l$ and $c_i$ for $\theta_i \in \Theta^h$ and $\theta_i \neq \theta_j$. It is constant in $b$.

(iii) Flexibility occurs when $w_i/c_i$ for $\theta_i \in \Theta^h$ is sufficiently high or $w_i/c_i$ for $\theta_i \in \Theta^l$ is sufficiently low.

(iv) The Type I error avoidance rate is lower for any combination of $w_i$ and $c_i$ excluding $c_j$ satisfying (10) than for any such combination that does not. The Type II error avoidance rate is decreasing in $c_j$ and constant in all $w_i$ and other $c_i$.

Comment 2 has two notable implications. The first lies in the contrast between parts (i) and (ii): overall spending and per capita spending move in opposite directions. In equilibrium, larger budgets are spent on larger client populations and less expert investigations.\(^8\)

The second follows from the contrast between parts (iii) and (iv): since bureaucratic flexibility results from acceptance bias, it is associated with lower average testing levels and in turn a higher frequency of only Type I errors.\(^9\) In summary, when a qualified type is favored, higher budgets are associated with reduced per capita spending, an increased client population, more flexibility, and more Type I errors.

These comparative statics in Comment 2 are generally strict when there is acceptance bias, or roughly when the bureaucrat “agrees” with the principal on the distribution of effort across types. The bureaucrat’s motivation to test is increasing in both how much she cares about desired outcomes for particular types ($w_i$), and the potential “impact” of testing (i.e., low $c_i$). Acceptance bias is not satisfied when the bureaucrat is more interested in denying marginal types than approving qualified ones (i.e., $w_i/c_i$ is relatively high for types in $\Theta^l$). As Proposition 3 establishes, this generates a smaller total budget. However, a politician who favors one type $\theta_j$ in $\Theta^h$ need not appoint a bureaucrat who cares much about $\theta_j$ in particular in order to induce acceptance bias. As (10) suggests, increasing the bureaucrat’s motivation sufficiently for any types in $\Theta^h$ is sufficient. This is a consequence of the bureaucrat’s inability to discriminate across types with increasing valuations.

---

\(^8\)This relationship does not always hold in the comparison of budgets between the cases where the principal favors qualified and marginal types. Thus the most error-prone programs may actually be larger than those that spend more per capita.

\(^9\)The comparative statics on the Type I error avoidance rate are ambiguous, as it may be increasing or decreasing when (10) holds.
3.4.2 Politicization

Politicization of the bureaucracy can take on many forms, including the appointment of particular personnel and pork barrel spending. In the model, politicization might also be interpreted as the bureaucrat’s ability to be flexible, since is only able to discriminate across client types in a way that benefits a favored qualified type. Here I examine the politicization of the bureaucrat’s testing technology. Since the bureaucrat cares primarily about the quality of her implemented tests, she prefers higher values of $c_i$ for all types.

The result of Comment (i) suggests that a politician who cares about a marginal group might do better by forcing the bureaucrat to use a less effective test, or equivalently by making the bureaucrat’s classification problem “harder.” A lower value of $c_j$ increases the probability that members of such a group pass the test, and thereby gives the politician an incentive to dictate less accurate procedures or technologies, or to use less competent personnel. As an example, Mills (2013) documents congressional manipulation of benefit-cost analysis to limit the Federal Aviation Administration’s ability to evaluate outsourced control tower services.

By contrast, a politician who favors a qualified type has no such incentive. By maximizing $c_j$, he can both please the bureaucrat and secure greater benefits for his preferred group. The following comment confirms these intuitions. I note without proof that a similar result would hold for $\alpha$.

Comment 3 Politicization of Testing Technology. Let $\theta_j \in \Theta^h$ be the principal’s favored type. (i) When $\theta_j \in \Theta^l$, $u_p(p^*, T^*; \theta_j)$ is decreasing in $c_j$.
(ii) When $\theta_j \in \Theta^h$, $u_p(p^*, T^*; \theta_j)$ is increasing in $c_j$. ■

4 Extensions

4.1 Error Minimization

The first extension considers the model’s robustness to changes in the principal’s objective. Suppose that instead of caring about the welfare of a group, the principal cared about a weighted sum of Type I and Type II error avoidance. This captures the idea that in some environments politicians must balance the relative costs of different types of error, just as bureaucrats must. The extension therefore gives the principal a policy utility function that

\[ u_p(p^*, T^*; \theta_j) \]

\[ 10 \text{ Common examples include rocket launches and pharmaceutical approvals (Heimann 1997).} \]
is identical in form to the bureaucrat’s. For convenience I focus on the mixed valuations case.

Let \( e_i \geq 0 \) denote the weighting on error avoidance for each type \( \theta_i \). This objective introduces two basic changes in the principal’s objective. First, for types in \( \Theta^l \), the politician now benefits from denials of the good, as he avoids a Type I error with probability \( 1 - \phi(t(\theta_i); \theta_i) \). By contrast, for types in \( \Theta^h \), \( e_i \) plays a similar role to the previously-used payoff weighting \( \theta_i \). Conveniently, this results in an objective that is concave in testing levels for every type. Second, the principal is now also affected by the population of \( N - p \) clients who are unreached by the policy. By not receiving the good, marginal clients in this pool avoid Type I error with certainty, but qualified clients suffer Type II errors with certainty.

Obviously, the bureaucrat’s problem is unchanged: the condition for acceptance bias (10) remains, as does the policy choice characterized by Proposition 2. Thus, any effect on the equilibrium operates through the principal’s choice of \( T \) and \( p \).

The principal’s revised objective can be written:

\[
 u_e(p, T) = p \sum_{i \in I^l} \pi_i e_i (1 - \phi(t(\theta_i); \theta_i)) + \sum_{i \in I^h} \pi_i e_i \phi(t(\theta_i); \theta_i)) + (N - p) \sum_{i \in I^l} \pi_i e_i - \frac{bT^2}{2}. \tag{16}
\]

One additional piece of notation will be useful. Define the following weighted measure of the politician’s incentive to test all types:

\[
 \epsilon(m^\alpha, \bar{m}) = m^\alpha \sum_{i \in I^l} \frac{\pi_i e_i}{c_i} + \bar{m}^\alpha \sum_{i \in I^h} \frac{\pi_i e_i}{c_i}
\]

The result can then be stated as follows.

**Proposition 4** Error Minimization. *At an interior solution:*

\[
 T_e = \begin{cases} 
 \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{(\alpha+1)/\alpha}}{b(\alpha+1)^{(\alpha+1)/\alpha} \epsilon(m^\alpha, \bar{m})^{1/\alpha}} & \text{if (10) holds} \\
 \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{(\alpha+1)/\alpha}}{b(\alpha+1)^{(\alpha+1)/\alpha} \sum_{i \in I^h} \pi_i e_i} & \text{if (10) does not hold,}
\end{cases}
\]

\[
 p_e = \begin{cases} 
 \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{(\alpha+2)/\alpha}}{b(\alpha+1)^{(\alpha+2)/\alpha} \epsilon(m^\alpha, \bar{m})^{2/\alpha}} & \text{if (10) holds} \\
 \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{(\alpha+2)/\alpha}}{b(\alpha+1)^{(\alpha+2)/\alpha} \sum_{i \in I^h} \pi_i e_i} & \text{if (10) does not hold,}
\end{cases}
\]

\[
 t_e(\theta_i) = \begin{cases} 
 T_e \sqrt{p_m} & \text{if } \theta_i \in \Theta^h \text{ and (10) holds} \\
 T_e \sqrt{p_m} & \text{if } \theta_i \in \Theta^l \text{ and (10) holds} \\
 T_e \sqrt{p} & \text{if (10) does not hold.}
\end{cases}
\]
Many features of the equilibrium are similar to those of the basic model, but two differences stand out. First, because the principal benefits directly from testing marginal types, there will generally be interior levels of testing even when he cares only about marginal types. This largely eliminates the “corner” case with minimal testing seen in Proposition 3. Second, an increased concern with avoiding Type I errors (i.e., higher values of $e_i$ for marginal types) has the unambiguous effect of shrinking both a program’s budget and population size, while increasing average testing levels.

4.2 Budget Maximization

Dating back at least to Niskanen (1971), observers have posited budget maximization as a basic bureaucratic objective. Budget maximization captures the notion of bureaucratic agency heads as “empire builders” who accumulate power and resources at the expense of social welfare.\(11\)

With a simple modification, the model can incorporate this objective. Suppose that the bureaucracy consists of two actors. One acts as the bureaucrat in the preceding analysis, and the other begins the game by choosing the bureaucrat’s payoff weight ($w_i$) parameters with the objective of maximizing $T^*$. This second player might be considered an agency head or appointing official. Let $[w, \bar{w}]$ be the set of feasible values of $w_i$ for all types.

A first observation is that if $\theta_j \in \Theta^l$, then by Proposition 3 the budget is independent of the bureaucracy’s payoff weights and the weights of the subordinate bureaucrat do not matter. Focusing on the case where $\theta_j \in \Theta^h$, it is easy to see from Proposition 3 that the equilibrium budget $T^*$ is decreasing in $\bar{m}$, and higher when condition (10) is not satisfied.

The following result characterizes the agency head’s optimal configuration of weights.

**Comment 4 Budget Maximization.** There exists a $w > 0$ such that a budget-maximizing agency head chooses $w_i = \bar{w}$ for $\theta_i \in \Theta^h$, and $w_i = w$ for $\theta_i \in \Theta^l$. $\blacksquare$

From a budget maximizer’s perspective, the optimal bureaucrat is one who is maximally biased toward approvals. The subordinate bureaucrat in this agency aggressively investigates declared qualified types, and is lax toward marginal types.

The result follows from the fact that a bias toward approvals of all types maximizes the bureaucrat’s discrimination between the two type classes. This encourages a politician who cares about a type in $\Theta^h$ to spend more, as no resources are “wasted” investigating types in

---

\(11\)The assumption is not universally accepted; Wilson (2000) offers some important counter-examples.
Thus, even when the bureaucratically allocated good is not costly, high allocation levels can be consistent with the behavior of budget-maximizing agencies.

4.3 Testing Standards

Suppose that, in addition to $T$ and $p$, the bureaucrat were bound by a minimum or maximum testing level for all clients. In some environments, such as education, legislatures impose testing requirements that bureaucrats use in order to advance students. In others, such as law enforcement, courts can impose “due process” requirements on politicians and bureaucrats. The obvious trade-off is that a principal could conceivably improve the payoff of his favored group through higher mandated testing levels, but such testing levels would require higher expenditures.

Formally, suppose that instead of allowing any testing level satisfying $t(\theta_i) \geq 1$, testing levels for all types are constrained to satisfy $t(\theta_i) \in [t_{\text{min}}, t_{\text{max}}]$. For simplicity, assume that at $t_{\text{min}}$, all IR constraints are satisfied. When it is binding, the effect of such a restriction is easily calculated in the cases where the bureaucrat does not discriminate across types. For example, if the principal’s favored type is some $\theta_j \in \Theta^l$, then by the same argument as in the previous section he simply minimizes testing and chooses a budget to match: $T^* = Nt_{\text{min}}$, $p^* = N$, and $t^* = t_{\text{min}}$. In these cases, it is clear that the principal cannot benefit from a testing standard. Since the bureaucrat’s budget constraint is binding, the uniform testing level will be $T/p$ and any testing standard can only constrain the principal.

More generally, the following comment shows that the principal cannot benefit from a testing restriction. Such restrictions are too crude of a means of inducing higher testing for a favored client type. Because of the budget constraint, for any given budget ceilings and floors will always constrain the principal from maximizing the acceptance probability of a favored group.

Comment 5 Testing Restrictions. *The principal cannot benefit from a testing standard.*

What might explain the presence of testing standards? One possibility is that they can be useful when the principal is unable to specify other parameters of the bureaucrat’s behavior. For example, if the principal cannot designate $p$, then a mandated maximum testing level could establish a floor on client population. Relatedly, a second possibility is that testing standards can be imposed by other principals. A second principal who cared about not approving too many types in $\Theta^l$ could use a minimum testing standard to force
more scrutiny upon types that the principal and bureaucrat would otherwise ignore. This principal might be a court, or another legislator whose support is necessary for enacting the program in question.

4.4 Costly Goods

One important assumption of the preceding analysis is that the bureaucratically allocated good is costless to the principal. In many instances, this is not the case: social welfare benefits are obviously quite costly, and building permits create opportunity costs. Costly goods create an important trade-off, as they reduce the principal’s incentive to test types in $\Theta^h$, but increase his incentive to test types in $\Theta^l$.

To see the effects of costly goods, suppose that each allocated good has a unit cost $\gamma < 1$. I focus on the case where $\theta_j \in \Theta^h$ and the bureaucrat is not acceptance biased, so she does not discriminate across types. The principal’s objective can then be written:

$$u^*_p(p, T; \theta_j) = \pi_j p \left(1 - \frac{p^x}{c^x_j T^x}\right) \theta_j - \gamma p \left[\sum_{i \in I^h} \pi_i \left(1 - \frac{p^x}{c^x_i T^x}\right) + \sum_{i \in I^l} \pi_i \frac{p^x}{c^x_i T^x}\right] - \frac{b}{2} T^2. \quad (17)$$

The following comment generalizes the corresponding case of Proposition 3 and presents the equilibrium budget, client population, and testing level.

**Comment 6** Costly Goods. If $\theta_j \in \Theta^h$ and (10) does not hold, then at an interior solution:

$$T^* = \frac{\alpha}{b} \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{\alpha + 1}\right)^{\frac{\alpha + 1}{\alpha}} \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{c^x_j}\right)^{\frac{\alpha + 2}{\alpha}} - \gamma \left[\sum_{i \in I^h} \pi_i \frac{c^x_i}{c^x_j} - \sum_{i \in I^l} \pi_i \frac{c^x_i}{c^x_j}\right]^{-\frac{1}{\alpha}}$$

$$p^* = \frac{\alpha}{b} \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{\alpha + 1}\right)^{\frac{\alpha + 2}{\alpha}} \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{c^x_j}\right)^{\frac{\alpha + 2}{\alpha}} - \gamma \left[\sum_{i \in I^h} \pi_i \frac{c^x_i}{c^x_j} - \sum_{i \in I^l} \pi_i \frac{c^x_i}{c^x_j}\right]^{-\frac{2}{\alpha}}$$

$$t^* = \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{\alpha + 1}\right)^{-\frac{1}{\alpha}} \left(\frac{\pi_j \theta_j - \gamma \sum_{i \in I^h} \pi_i}{c^x_j}\right)^{\frac{1}{\alpha}}.$$

These expressions make clear that compared to the basic model, when there is a sufficiently high probability weight on types in $\Theta^l$, costly goods will reduce both the budget and the client population. However, per capita testing increases. The effect of increasing costs can therefore be similar to that of moving from the discrimination to non-discrimination cases in the baseline model.
I note finally that if $\theta_j \in \Theta^l$, then costly goods might induce the principal to offer a budget higher than the minimum seen in Proposition 3. This requires that there be sufficient probability weight on types in $\Theta^l$ besides $\theta_j$, which from the principal’s perspective generates many wasted allocations.

5 Conclusions

Theories of political control of the bureaucracy have made considerable progress in recent decades, but much of this work is connected in limited ways to concrete aspects of public administration. Apart from a burgeoning literature on corruption, this gap has impeded theoretically motivated empirical work on the bureaucracy. This paper represents an initial attempt at filling this gap.

The model begins with a foundation of incomplete information, bureaucratic expertise, resource constraints, and political control. There is a natural technological trade-off between client populations and per capita spending (or equivalently, testing), but the model provides guidance as to how these trade-offs are resolved. In particular, the politician’s distributive concerns and the bureaucrat’s testing preferences both generate stark predictions about implementation flexibility, budget size, errors, and whether policy implementation tends toward breadth or depth.

Three styles of programs emerge from the analysis. The largest and most error-prone programs result when the politician cares about a marginal group and the bureaucrat uses an inaccurate testing technology. In this environment, the bureaucrat has a minimum of resources per client, and her preferences are irrelevant to the outcome. Perversely, the principal also has an incentive to weaken the bureaucrat’s testing technology. When the principal cares about a qualified group, error rates are lower overall. Depending on the bureaucrat’s testing inclinations, programs are either smaller and inflexible or larger and flexible, and hence appointments matter.

While the model addresses a broad set of bureaucratic outputs, it omits some important technological and institutional features. For example, in some environments there are natural limits on the quantity of the good to be distributed. Additionally, the politician cannot punish the bureaucrat, and the bureaucrat’s individual rationality constraint is automatically satisfied. In reality, principals may have some punishment ability, but would need also to worry about the bureaucrat’s labor market alternatives and possible collusion with clients. The model also makes somewhat arbitrary choices about what politicians can control. While
it is clearly reasonable that politicians control agency budgets, it is less obvious that the size of the client population should be the only other decision variable. Another possibility is that the principal could manipulate the probability of acceptance through judicial appeals or other procedural mechanisms. Finally, in many political systems the role of multiple principals, either as actors who forge compromises in program design or as active overseers, deserves consideration.
APPENDIX

Proof of Lemma 1. As the objective is concave with respect to all $t_i$ and the constraint is linear, first order conditions are sufficient for characterizing the optimal testing levels. The Lagrangian is:

$$\mathcal{L} = \sum_{i \in I^h} \pi_i w_i \phi(t_i; \theta_i) + \sum_{i \in I} \pi_i w_i (1 - \phi(t_i; \theta_i)) + \lambda \left( T - p \sum_i \pi_i t_i \right).$$

Differentiation yields:

$$\frac{\partial \mathcal{L}}{\partial t_i} = \frac{\alpha \pi_i w_i}{c_i} t_i^{\alpha - 1} - \lambda p \pi_i = 0$$

$$\vdots$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = T - p \sum_i \pi_i t_i = 0.$$

Manipulation of $\frac{\partial \mathcal{L}}{\partial t_i}$ produces:

$$\lambda = \frac{\alpha w_i}{c_i p} t_i^{\alpha - 1}$$

Substituting into $\frac{\partial \mathcal{L}}{\partial t_j}$ then yields:

$$\frac{\alpha \pi_j w_j}{c_j} t_j^{\alpha - 1} = \frac{\alpha \pi_i w_i}{c_i} t_i^{\alpha - 1}$$

$$t_j = \left( \frac{c_i w_j}{c_j w_i} \right)^{\frac{1}{1+\alpha}} t_i$$

This solution applies for all interior $t_i, t_j$, as claimed. ■

Proof of Lemma 2. Suppose otherwise; i.e., there exists some $t_j^* > t_i$ for types $\theta_j$ and $\theta_k$. Under decreasing valuations, it is clear that $u_c(\theta_j; \theta_j) < u_c(\theta_k; \theta_j)$. Thus, type $\theta_j$ would strictly prefer to claim to be type $\theta_k$, contradicting IC. Under increasing valuations we have $u_c(\theta_k; \theta_k) < u_c(\theta_j; \theta_k)$, and so type $\theta_k$ would strictly prefer to claim to be type $\theta_j$, also contradicting IC.

Finally, under decreasing valuations IR is satisfied for all $i$ only if $t^* < t_i^{IR}$ for all $i$. Under increasing valuations, IR is satisfied for any $t_i$. ■

Proof of Proposition 1. (i) If $\theta_i \in \Theta^f$ for all $i$ (i.e., decreasing valuations), then it is easily verified that (9) is increasing in $p$ and decreasing in $T$, thus implying $T^* = p^*$ (since the minimum testing level is 1) and $t^* = 1$. Substituting into (9) produces a concave function of $p$. This produces the following first order condition:

$$\frac{du_p}{dp} = \frac{\pi_j \theta_j}{c_j} - bp = 0.$$
This produces a unique interior solution $p^* = \frac{\pi_j \theta_j}{bc_j}$.

(ii) If $\theta_i \in \Theta^h$ for all $i$ (i.e., increasing valuations), then observe that the principal’s objective (9) is concave in $p$ and $T$. Thus necessary conditions for an optimum are:

$$\frac{\partial u_p}{\partial T} = \alpha \pi_j \frac{p^{\alpha+1}}{c_j T^{\alpha+1}} \theta_j - b T = 0$$

$$\frac{\partial u_p}{\partial p} = \pi_j \theta_j - (\alpha + 1) \pi_j \frac{p^\alpha}{c_j T^\alpha} \theta_j = 0.$$

Solving yields:

$$T = \frac{\alpha \pi_j \theta_j \bar{c}_j^\frac{1}{\alpha}}{b (\alpha + 1)^\frac{\alpha}{\alpha + 1}}$$

$$p = \frac{\alpha \pi_j \theta_j \bar{c}_j^\frac{2}{\alpha}}{b (\alpha + 1)^\frac{\alpha}{\alpha + 2}}.$$

Testing levels $t^*$ are derived simply by substituting into (3).

**Proof of Lemma 3.** The arguments for why $t_i^* = t^R_i$ for all $\theta_i \in \Theta^l$ and $t_i^* = t^h_i$ for all $\theta_i \in \Theta^h$ are identical to those in Lemma 2.

To show that $t^R_i \leq t^h_i$, suppose otherwise. Then for all types $\theta_j \in \Theta^l$ and $\theta_k \in \Theta^h$, $u_c(\theta_j; \theta_j) < u_c(\theta_k; \theta_j)$ and $u_c(\theta_k; \theta_k) < u_c(\theta_j; \theta_k)$. Thus, all types in $\Theta^l$ (respectively, $\Theta^h$) would strictly prefer to claim to be of a type in $\Theta^h$ (respectively, $\Theta^l$), contradicting IC.

**Proof of Proposition 2.** (i) As the objective is concave with respect to all $t_i$ and the constraint is linear, first order conditions are sufficient for characterizing the optimal testing levels. Denote by $\underline{t}$ and $\bar{t}$ (uniform) testing levels for types in $\Theta^l$ and $\Theta^h$, respectively. The Lagrangian is:

$$\mathcal{L} = \sum_{i \in I^l} \pi_i w_i (1 - \phi(t_i; \theta_i)) + \sum_{i \in I^h} \pi_i w_i \phi(\bar{t}; \theta_i) + \lambda \left( T - p \sum_{i \in I^l} \pi_i \underline{t} - p \sum_{i \in I^h} \pi_i \bar{t} \right).$$

Differentiation yields:

$$\frac{\partial \mathcal{L}}{\partial \underline{t}} = \alpha t_i^{-\alpha-1} \sum_{i \in I^l} \pi_i w_i - \lambda p \sum_{i \in I^l} \pi_i = 0$$

$$\frac{\partial \mathcal{L}}{\partial \bar{t}} = \alpha \bar{t}^{-\alpha-1} \sum_{i \in I^h} \pi_i w_i - \lambda p \sum_{i \in I^h} \pi_i = 0$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = T - p \sum_{i \in I^l} \pi_i \underline{t} - p \sum_{i \in I^h} \pi_i \bar{t} = 0.$$
Let $P_l = \sum_{i \in \mathcal{I}} \pi_i$, $P_h = \sum_{i \in \mathcal{H}} \pi_i$, $S_l = \sum_{i \in \mathcal{I}} \frac{\pi_i w_i}{c_i}$, and $S_h = \sum_{i \in \mathcal{H}} \frac{\pi_i w_i}{c_i}$. Then manipulation of $\frac{\partial L}{\partial t}$ produces:

$$\lambda = \frac{\alpha S_l}{P_l L^{-\alpha - 1}}$$

Substituting into $\frac{\partial L}{\partial t}$ then yields:

$$S_l t_l^{-\alpha - 1} = \frac{P_h S_l}{P_l} L^{-\alpha - 1}$$

Substituting into the budget constraint produces:

$$t^* = \frac{T}{p \left[ 1 - P_l \left( \frac{P_h S_l}{P_l S_h} \right)^{\frac{1}{\alpha}} \right]}$$

Note that these solutions are interior iff $t^* \geq 1$ and $t^* \geq 1$.

Finally, consider the IC constraints. By Lemma 3, IC is satisfied for all types if $t^* > t^*$, or:

$$P_l \left[ 1 - \left( \frac{P_h S_l}{P_l S_h} \right)^{\frac{1}{\alpha}} \right] > P_h \left[ 1 - \left( \frac{P_h S_l}{P_l S_h} \right)^{-\frac{1}{\alpha}} \right]$$

This expression holds iff $P_h S_l < P_l S_h$, which is equivalent to (10).

(ii) Abusing notation slightly, let $u_b(t^h, t^l)$ denote the bureaucrat’s objective when all types $\Theta^h$ receive testing level $t^h$ and all types in $\Theta^l$ receive testing level $t^l$. If (10) does not hold, then $\bar{t} \leq t$. Suppose that there exists a feasible solution $(\bar{t}, \bar{t}')$ such that $\bar{t} > \bar{t}'$. Note also that if $t^h = \bar{t}^l$, then the optimal is $T/p$. If $(\bar{t}', \bar{t}')$ gives the bureaucrat higher utility than $t_i = T/p$ for all $\theta_i$, then:

$$u_b(\bar{t}, \bar{t}) > u_b(T/p, T/p)$$

Now observe that $(\bar{t}', \bar{t}')$, $(\bar{t}, \bar{t})$, and $(T/p, T/p)$ all lie along the bureaucrat’s budget constraint. Thus, any $(\bar{t}', \bar{t}')$ such that $\bar{t}' > \bar{t}'$ must violate the concavity of the bureaucrat’s objective function: contradiction. The optimal allocation satisfying IC is therefore $(T/p, T/p)$. The IR constraints are satisfied in the same way as in part (i).
Proof of Proposition 3. If \( \theta_j \in \Theta^l \), then \( \hat{u}_c(\theta_i, t_i) \) is decreasing in \( t_i \) and hence \( u_p(p, T; \theta_j) \) is also decreasing in \( t_j \). Thus, \( t_j^* = t^{*l} = T^{*l} = 1 \) and \( T^* = p^* \). The maximization problem is then identical to the decreasing valuations case in Proposition 1.

If \( \theta_j \in \Theta^h \) and (10) does not hold, then by Proposition 2(ii), \( t_j^* = t^{*h} = T^{*h}/p^* \), where \( T^* \) is the budget from the increasing valuations case. The principal’s objective is then identical to (9), and the result is identical to that of the increasing valuations case of Proposition 1.

Finally, if \( \theta_j \in \Theta^h \) and (10) holds, then \( t_j^* \) is given by Proposition 2(i) and the principal’s corresponding objective is given by (15). It is straightforward to verify that this objective is concave in \( p \) and \( T \). Thus necessary conditions for an optimum are:

\[
\begin{align*}
\frac{\partial u_p}{\partial T} &= \alpha \pi_j \frac{\bar{m}^\alpha p^{\alpha+1}}{c_j T^{\alpha+1}} \theta_j - bT = 0 \\
\frac{\partial u_p}{\partial p} &= \pi_j \theta_j - (\alpha + 1) \pi_j \frac{\bar{m}^\alpha p^\alpha}{c_j T^\alpha} \theta_j = 0.
\end{align*}
\]

Solving yields:

\[
\begin{align*}
T &= \frac{\alpha \pi_j \theta_j c_j^{\frac{1}{\alpha+1}}}{b \bar{m} (\alpha + 1)_{\alpha+1}} \\
p &= \frac{\alpha \pi_j \theta_j c_j^{\frac{2}{\alpha+2}}}{b \bar{m}^2 (\alpha + 1)_{\alpha+2}}.
\end{align*}
\]

The testing levels \( t^{*l} = T^*/(p^* \bar{m}) \) and \( t^{*h} = T^*/(p^* \bar{m}) \) follow from Proposition 2(i).

Proof of Comment 2. (i) First consider the values of \( T^* \) and \( p^* \) from Proposition 3 conditional upon whether (10) holds. When it does not, \( T^* \) and \( p^* \) are independent of all \( w_i \) and \( c_i \), except for \( c_j \). Note that \( \bar{m} \) is decreasing in \( w_i \) for \( \theta_i \in \Theta^h \) and \( c_i \) for \( \theta_i \in \Theta^l \), and increasing in \( w_i \) for \( \theta_i \in \Theta^l \) and \( c_i \) for \( \theta_i \in \Theta^h \). Thus when (10) does hold, \( T^* \) and \( p^* \) are increasing in \( w_i \) for \( \theta_i \in \Theta^h \) and \( c_i \) for \( \theta_i \in \Theta^l \), and decreasing in \( w_i \) for \( \theta_i \in \Theta^l \) and \( c_i \) for \( \theta_i \in \Theta^h \) and \( \theta_i \neq \theta_j \).

Next, consider the the values of \( T^* \) and \( p^* \) when both sides of (10) are equal. This implies \( \bar{m} = 1 \), and hence \( T^* \) and \( p^* \) are continuous in all \( w_i \) and \( c_i \). Since (10) is satisfied when \( w_i \) for \( \theta_i \in \Theta^h \) or \( c_i \) for \( \theta_i \in \Theta^l \) are sufficiently large, or \( w_i \) for \( \theta_i \in \Theta^l \) or \( c_i \) for \( \theta_i \in \Theta^h \) and \( \theta_i \neq \theta_j \) are sufficiently small, the result follows.

The result for \( b \) follows from the expressions for \( T^* \) and \( p^* \) in Proposition 3.

(ii) Using Proposition 3, per capita spending is given by:

\[
T^* = \begin{cases} \\
\frac{\bar{m}(\alpha+1)^{1/\alpha}}{c_j^{1/\alpha}} & \text{if (10) holds} \\
\frac{(\alpha+1)^{1/\alpha}}{c_j^{1/\alpha}} & \text{if (10) does not hold} 
\end{cases}
\]

This expression is increasing in \( \bar{m} \) if (10) holds, and also dependent on \( c_j \). Thus it is straightforward to show that the comparative statics are the reverse of those for \( T^* \) and \( p^* \) in part (i).
The result for $b$ follows from the expressions for $T^*$ and $p^*$ in Proposition 3.

(iii) By Proposition 2, flexibility occurs when (10) holds. Since (10) is satisfied when $w_i$ for $\theta_i \in \Theta^h$ or $c_i$ for $\theta_i \in \Theta^l$ are sufficiently large, or $w_i$ for $\theta_i \in \Theta^l$ or $c_i$ for $\theta_i \in \Theta^h$ are sufficiently small, the result follows.

(iv) To show the result for Type I errors, note that $t_h^*$ is independent of all $w_i$ and for all $c_i$ excluding $\theta_i = \theta_j$. By Proposition 2, $t_l^* < t_h^*$ when (10) holds, and thus any combination of the above $w_i$ and $c_i$ parameters such that (10) holds results in a higher probability of passage for types in $\Theta^l$, thus establishing the result.

The result on Type II errors follows from the expression for $t_h^*$ in Proposition 3.

Proof of Comment 3. (i) When the favored group is marginally qualified, $T^*/p^* = 1$. Substituting into the principal’s objective (9) yields:

$$u_p(p^*, T^*; \theta_j) = \pi_j p^* \left( \frac{\theta_j - k_j}{c_j} \right) - \frac{b}{2} T^2$$

$$= \frac{\pi_j^2 \theta_j}{b c_j} \left( \frac{\theta_j}{2 c_j} - k_j \right).$$

Taking the derivative, this expression is decreasing in $c_j$ if $k_j < \theta_j/c_j$, which holds by assumption in order for a minimal testing level to be feasible.

(ii) Substituting form Proposition 3 the objective for both the acceptance biased and non-acceptance biased cases is:

$$u_p(p^*, T^*; \theta_j) = \pi_j p^* \left( \frac{\alpha}{\alpha + 1} \right) \theta_j - \frac{b}{2} T^2$$

First consider the subcase of a non-acceptance biased bureaucrat. Substituting $p^*$ and $T^*$ into (18) produces:

$$u_p(p^*, T^*; \theta_j) = \pi_j \left( \frac{\alpha \pi_j \theta_j c_j^{2/\alpha}}{b m^2 (\alpha + 1)^{(\alpha+2)/\alpha}} \right) \left( \frac{\alpha}{\alpha + 1} \right) \theta_j - \frac{b}{2} \left( \frac{\alpha \pi_j \theta_j c_j^{1/\alpha}}{b m (\alpha + 1)^{(\alpha+1)/\alpha}} \right)^2$$

$$= \frac{\alpha^2 \pi_j^2 \theta_j^2 c_j^{2/\alpha}}{2 b m^2 (\alpha + 1)^{(2\alpha+2)/\alpha}}$$

This expression is obviously increasing in $c_j$.

Next, for the subcase of a non-acceptance biased bureaucrat, note that the calculation is identical after substituting $m = 1$.

Proof of Proposition 4. First consider an acceptance biased bureaucrat (i.e., (10) holds). From the derivation in Section 3.3, $m$ and $m$ are the ratios between $T/p$ and the bureaucrat’s testing levels under mixed valuations for high and low types, respectively. Thus, the bureaucrat tests types in $\Theta^h$ and $\Theta^l$ at level $T/(pm)$ and $T/(pm)$, respectively.
The principal’s objective [16] can then be rewritten in terms of \( p \) and \( T \) as follows.

\[
u^e_p(p,T;\theta_j) = p \left[ \sum_{i \in I} \pi_i e_i \left( 1 - \frac{p^\alpha m^\alpha c_i}{c_i T^\alpha} \right) + \sum_{i \in I^h} \pi_i e_i \left( 1 - \frac{p^\alpha m^\alpha}{c_i T^\alpha} \right) \right] + \left( N - p \right) \sum_{i \in I^l} \pi_i e_i - \frac{bT^2}{2}. \tag{19}
\]

The first order conditions are:

\[
\frac{\partial u^e_p}{\partial T} = \alpha \left( \frac{m^\alpha}{c_i} \sum_{i \in I} \pi_i e_i \frac{p^{\alpha+1}}{c_i T^{\alpha+1}} + \frac{m^\alpha}{c_i} \sum_{i \in I^h} \pi_i e_i \frac{p^{\alpha+1}}{c_i T^{\alpha+1}} \right) - bT = 0
\]

\[
\frac{\partial u^e_p}{\partial p} = \sum_i \pi_i e_i - \left( \alpha + 1 \right) \left( \sum_{i \in I} \pi_i e_i \frac{p^\alpha m^\alpha}{c_j T^\alpha} + \sum_{i \in I^h} \pi_i e_i \frac{p^\alpha m^\alpha}{c_j T^\alpha} \right) - \sum_i \pi_i e_i = 0.
\]

These simplify to:

\[
T^e = \left[ \frac{p^{\alpha+1} \alpha}{b} \frac{1}{\epsilon(m^\alpha, m^\alpha)} \right]^\frac{1}{\alpha+2}
\]

\[
p^e = T \left[ \frac{\sum_{i \in I^h} \pi_i e_i}{(\alpha + 1)\epsilon(m^\alpha, m^\alpha)} \right]^\frac{1}{\alpha}.
\]

Solving then produces:

\[
T^e = \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{\frac{\alpha+1}{\alpha}}}{b(\alpha + 1)^{\frac{\alpha+1}{\alpha}} \epsilon(m^\alpha, m^\alpha)^{\frac{1}{\alpha}}}
\]

\[
p^e = \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{\frac{\alpha+2}{\alpha}}}{b(\alpha + 1)^{\frac{\alpha+2}{\alpha}} \epsilon(m^\alpha, m^\alpha)^{\frac{2}{\alpha}}}.
\]

The average testing level is \( T^e/p^e = \left( \frac{(\alpha+1)\epsilon(m^\alpha, m^\alpha)}{\sum_{i \in I^h} \pi_i e_i} \right)^{1/\alpha} \). The equilibrium testing levels are then \( t^{he} = T^e/(p^e m) \) and \( t^{le} = T^e/(p^e m) \).

Next, consider a non-acceptance biased bureaucrat (i.e., (10) does not hold). By Proposition [2], all testing levels are identically \( T/p \). The principal’s solution for \( T \) and \( p \) can then be found by setting \( m = m = 1 \) in the preceding derivation. This produces:

\[
T^e = \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{\frac{\alpha+1}{\alpha}}}{b(\alpha + 1)^{\frac{\alpha+1}{\alpha}} \sum_i \pi_i e_i/c_i}
\]

\[
p^e = \frac{\alpha \left( \sum_{i \in I^h} \pi_i e_i \right)^{\frac{\alpha+2}{\alpha}}}{b(\alpha + 1)^{\frac{\alpha+2}{\alpha}} \sum_i \pi_i e_i/c_i}.
\]

**Proof of Comment 4.** From Proposition 3, the budget when \( \theta_j \in \Theta^h \) is:

\[
T^* = \begin{cases} 
\frac{a \pi_j \theta_j e_j^{1/\alpha}}{b m(\alpha+1)^{(\alpha+1)/\alpha}} & \text{if (10) holds} \\
\frac{a \pi_j \theta_j e_j^{1/\alpha}}{b(\alpha+1)^{(\alpha+1)/\alpha}} & \text{if (10) does not hold,}
\end{cases}
\]
where $m$ is given in (13). $T^*$ is maximized by minimizing $m$ subject to (10) holding and $m < 1$. Rewriting (10) produces:

$$
\left( \sum_{i \in T} \pi_i \right) \left( \sum_{i \in T} \frac{\pi_i w_i}{c_i} \right) < \left( \sum_{i \in T} \pi_i \right) \left( \sum_{i \in T} \frac{\pi_i w_i}{c_i} \right). \tag{20}
$$

It is clear from (13) that $m < 1$ if (20) holds.

In the unconstrained problem, $m$ is minimized by choosing $w_i = \bar{w}$ for $\theta_i \in \Theta_t'$, and $w_i = \bar{w}$ for $\theta_i \in \Theta_h$. By the continuity of the left-hand side of (20) in $w_i$, there exists some $\bar{w}$ sufficiently close to 0 such that (20) is also satisfied at this solution, and thus $m < 1$ and (10) holds. \(\blacksquare\)

**Proof of Comment 5.** The argument for why the principal cannot benefit from any restrictions on $t$ when (10) does not hold is given in the text.

When (10) holds, suppose that under the testing restriction $t(\theta_i) \in [t_{\text{min}}, t_{\text{max}}]$ the bureaucrat implements $t''$ for types in $\Theta_t'$ and $t'h'$ for types in $\Theta_h$, where $t'' \leq t'$. Clearly, $t''$ and $t'h'$ satisfy the bureaucrat’s budget constraint for some population $p'$ and budget $T'$. By Proposition 2, in the absence of the testing restriction, the principal could use the same $p'$ and $T'$ to induce the bureaucrat to implement $t^h = \frac{p'}{p_m}$ for types in $\Theta_h$ and $t^t$ satisfying the budget constraint for types in $\Theta_t$. Since the budget constraint binds, there are two possibilities; first, either $t^h > t'$ and $t^t < t''$, or second, $t^h < t'$. Under the first, the principal does better without the testing restriction, since she maximizes the acceptance probability of some type in $\Theta_h$. Under the second, the principal does better under the testing restriction clearly does not bind on the bureaucrat and $t''$ and $t'h'$ cannot be the implemented testing level. Since the principal cannot benefit from a testing restriction for any given $T$ and $p$, he cannot benefit from any testing restriction. \(\blacksquare\)

**Proof of Comment 6.** Differentiating (17), the necessary conditions for an optimum are:

$$
\frac{\partial u_p}{\partial T} = \alpha \pi_j \frac{p^{a+1}}{c_j T^{a+1}} \theta_j - \alpha \gamma \left[ \sum_{i \in T_h} \pi_i \frac{p^{a+1}}{c_j T^{a+1}} - \sum_{i \in T_t} \pi_i \frac{p^{a+1}}{c_j T^{a+1}} \right] - bT = 0
$$

$$
\frac{\partial u_p}{\partial p} = \pi_j \theta_j - \pi_j \frac{(a+1)p^a}{c_j T^a} \theta_j - \gamma \left[ \sum_{i \in T_h} \pi_i \left(1 - \frac{(a+1)p^a}{c_j T^a}\right) + \sum_{i \in T_t} \pi_i \frac{(a+1)p^a}{c_j T^a} \right] = 0.
$$

Simplifying yields:

$$
T = \left( \frac{\alpha \pi_j \theta_j - \alpha \gamma}{b c_j} - \frac{\sum_{i \in T_h} \pi_i - \sum_{i \in T_t} \pi_i}{c_j} \right)^{\frac{1}{a+2}} p_{a+1}^{\frac{a+1}{a+2}}
$$

$$
p = \left( \frac{\pi_j \theta_j - \gamma \sum_{i \in T_h} \pi_i}{\pi_j \frac{(a+1)}{c_j} \theta_j - \gamma \sum_{i \in T_h} \pi_i \frac{(a+1)}{c_i} - \sum_{i \in T_t} \pi_i \frac{(a+1)}{c_i}} \right)^{\frac{1}{a}} T
$$

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Solving for this system yields the resulting $T^*$ and $p^*$. By (3), the testing level is simply $t^* = T^*/p^*$. ■
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