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Bribery and Temptation: More Red Tape or More Discretion?*

Ajit Mishra and Andrew Samuel†

Abstract

This paper studies the moral dilemma of bribery in the presence of official discretion. The moral dilemma is framed as a dynamic choice problem in which an official's present biased temptation preferences that value bribery conflict with commitment preferences that place more value on honesty. The tension between temptation and commitment becomes salient in the presence of the official's discretionary power. More discretion allows the official to lower red-tape which is socially beneficial, but it also makes bribery more tempting thereby making commitment to honesty more costly. Accordingly, a morally committed bureaucrat may choose less discretion (which generates more red-tape) as a remedy to avoid being tempted by bribery. Whereas, the welfare maximizing policy will often impose high discretion, which generates psychic temptation costs on honest officials.

JEL: D91, D73, K42

Keywords: Bribery, Commitment, Discretion, Temptation

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1 Introduction

Discretion has been identified as one of the main causes of corruption in some early seminal contributions (Klitgaard, 1988; Banfield, 1975). In a now famous "equation" Klitgaard states that C = M + D - A; that is, the level of corruption (C) equals monopoly power of officials (M) plus discretion (D) minus accountability (A). As such, officials charged with enforcing regulations will be especially tempted to accept bribes in exchange for not enforcing those regulations if they have considerable discretion over when and how those rules can be enforced. Whereas, if an official cannot apply rules with some degree of discretion they will either not be able to bend them in exchange for a bribe, or if they did would get caught fairly easily. Thus, the scope for, and temptation from, bribery is arguably stronger for officials with more authority or discretion over such regulations.

The idea that official discretion makes bribery tempting is salient when viewed from a separate literature on corruption that draws on political philosophy (Noonan, 1987) and moral psychology (Dungan et al., 2019; Nichols and Robertson, 2017). This strand of thinking on corruption has focused on understanding corrupt acts (such as bribery) as "moral dilemmas" in which individuals fail to make the right choice because they are tempted by the spoils of corruption. This idea, that bribery goes hand-in-hand with temptation, is found in some very early writings on corruption.[1] The ancient Indian political philosopher, Kautilya, made this observation nearly two thousand years ago when he wrote,

> *Just as it is impossible not to taste honey or poison that one may find at the tip of one's tongue, so it is impossible for one dealing with government funds not to taste, at least a little bit, of the King's wealth.* (Kautilya's Arthasashtra, Book 2, Chapter 9, Verse 32.)[2]

These ideas are supported by more recent research in behavioral economics on temptation and self-control, especially within the context of crime (Cervellati and Vanin (2013) and Greene (2014)). Specifically, it finds that when faced with choices involving right and wrong, individuals often

[1] Bribery will be defined as payments, monetary or otherwise, which a government official receives in exchange for granting favors. In some cases, as in embezzlement, the official simply receive the transfers (theft) with no reciprocal favors.

[2] The exact date is unknown and scholars do not rule out the possibility of several authors over time, but Kautilya was the Minister to the Maurya dynasty (approximately 200 BCE). This is based on translation by L.N. Rangarajan (1987).

feel conflicted between their commitment to act honestly, and the temptation to commit a crime. Similarly, Dungan et al. (2019) find that the decision to be corrupt is often an internal conflict between loyalty to the civil service's cadre and other loyalties (such as to friends or family). From these perspectives the decision to accept a bribe is a moral dilemma in which an official feels conflicted between two sets of preferences, one that prefers acting honestly and another that tempts them to accept a bribe.

The goal of this paper is to synthesize these two themes in the study of bribery. Specifically, we wish to investigate how an official who possesses some moral commitment to remain honest reacts to more discretion, which increases the temptation for corruption. Further, we investigate how much discretion should be given to such morally committed officials when more discretion increases the scope of corruption.

Of course if discretion is the source of temptation, then ridding bureaucrats of discretion can eliminate the temptation for corruption. But, giving officials discretion possesses many advantages, including the fact that it can reduce red-tape. This consideration is essential to our motivation.

Red-tape is loosely defined as formal requirements that are excessive or unnecessary. *Inter-alia* it can arise because there is often a "one-size-fits all" approach to regulation. Thus, for officials who are charged with enforcing regulations, discretion can be useful since it can enable them to disregard imposing unnecessary rules. For example, in the context of rental properties, multi-storied properties are required to have fire escapes, but certain two or three storied rentals are exempt if they have multiple stairways. Honest rental inspectors can use their discretion to determine which rules in the building code apply, and which are unnecessary, for a particular rental property.[3] Thus, giving an official discretion over which requirements to impose on a firm can improve efficiency.

To investigate this issue we develop a model in which firms are heterogeneous in their type. This type is isomorphic to the sub set of regulations that a firm must implement because only that subset of rules are welfare maximizing, given its type. The regulator cannot observe the firm's type. It hires an official who can (at no cost) observe the firm's type and, therefore, require that the firm implement only those the regulations that are deemed necessary. If the official has full discretion she can determine which regulations the firm must satisfy (given its type). But, with no

[3]For a detailed analysis on discretion in rental enforcement see Samuel et al. (2021). See also Potter (2019) for regulatory discretion in other contexts.

discretion, the official cannot exempt the firm from some, potentially unnecessary (and inefficient), regulations (i.e. exempt fire escapes for some properties). Thus, bureaucratic discretion generates a positive benefit.[4] However, this discretion also opens the door to corruption as it enables the official to waive essential regulations for a firm, in exchange for a bribe.[5]

Given this regulatory background, we model an official who first chooses her level of discretion (in period 1) and then whether or not to accept a bribe (in period 2). If an official chooses to possess too little discretion, her role is that of a functionary who routinely follows rules in a robotic manner and therefore is not tempted by bribery, but this also implies that she generates unnecessary red-tape for some firms. If she chooses too much discretion, then she can use that discretion to exempt a firm from following some unnecessary rules. But, in this case she may be tempted by bribery.[6]

To incorporate temptation we utilize a "dual self" model of choice. Officials possess present biased temptation preferences that do not acknowledge the pecuniary or moral sanctions associated with bribery and commitment preferences that do incorporate the pecuniary and moral costs associated with bribery. These preferences and the choice framework utilize the model developed by (Gul and Pesendorfer, 2001, 2004). Since this framework is relatively novel and is only recently being utilized in applied theory (Cervellati and Vanin, 2013; Esteban and Miyagawa, 2006; Esteban et al., 2007), we find it useful to illustrate its intuition briefly.

Consider a two-period decision problem where in the first period an individual must choose between a healthy, vegetarian restaurant and a steakhouse (which has some vegetarian options). This first stage choice amounts to choosing a menu with or without a tempting option (steak) on the menu. Having chosen their menu in the first period, the agent then chooses an item on the menu. If the agent goes to the steakhouse, but still chooses a salad, he incurs a temptation cost for having avoided the steak. But, by going to vegan restaurant he avoids this temptation cost altogether. Accordingly, an agent may choose a vegan restaurant in period 1 in order to avoid this

[4] Judicial discretion over sentences is another such example. Although in the U.S. judges are subject to sentencing guidelines for specific crimes, they are given discretion over whether to raise or lower penalties within certain limits. This allows them to tailor the sentence to the particularities of the crime and the criminal involved. In other policy contexts (Cowen et al., 2000) finds value in discretion.

[5] We do not consider extortion wherein the official threatens to impose excessive and unnecessary regulations on a firm unless the firm pays the official. As Basu et al. (2016) has shown extortion can be eliminated by encouraging the firm to report on the official.

[6] In section 3 we discuss examples of situations in which officials directly or implicitly choose their own level of discretion.

temptation cost, or may succumb to the temptation altogether.[7] Thus, the two key elements of their model are a menu choice in the first period, and temptation costs in the second period (if there is a tempting offer on the menu).

This framework allows us to study two sets of issues. The first set of results which we derive from this model are positive in the sense that we do not study the optimal level of discretion. We show that sanctions which are high enough to deter bribery in the absence of temptation are insufficient to deter it in the presence of temptation. This is because when the individual resists the temptation to accept a bribe she also incurs a psychological cost. Thus the sanction needs to compensate for this additional cost in order to deter bribery. Next we examine an individual's choice between two discretionary levels, a high discretionary position in which bribery is tempting and a second low level of discretion in which it is not. This problem is the equivalent "dual problem," to a choice framework in which the official is given a level of discretion, but can choose whether to investigate firms that are within their discretionary power (which opens the door to being tempted by bribery), or above their discretionary power (which does not tempt). Here we find that officials who would remain honest even when they possess a lot of discretionary authority choose to avoid such positions of authority and choose positions with less discretion in order to avoid temptation costs.

The second set of results are normative and are derived under incomplete information. Recall that a firm's type reflects the sub-set of regulations that are welfare maximizing. In this, more general, framework we assume that the regulator and the officials only know the distribution of firm types, but not each firm's type. Within this framework, we study how much discretion would be chosen by a welfare maximizing regulator and whether that level would be the same as that chosen by a utility maximizing official. This analysis reveals that in many cases, the optimum policy is one in which officials incur temptation costs. Further, if officials could choose their own level of discretion they would choose too little discretion in order to avoid temptation costs.

Following the introduction, section 2 reviews the literature, section 3 sets up the model of discretion. Section 4 studies the officials discretionary choices in the presence of temptation and commitment. Section 5 compares the official's discretionary choices with those of a welfare maxi-

[7] The idea behind their model is closely related to problems of "dynamic inconsistency", that is now well-known in economics (e.g. Loewenstein et al. (2003)). See Carrillo and Mariotti (2000) and especially Bryan et al. (2010) for a discussion of the relationship between these models.

mizing regulator under incomplete information, and section 6 concludes.

2 Literature

Our paper contributes to a growing interest in integrating morality into the economics of corruption (see Dhillon et al. (2023), Henke et al. (2022)). In their recent review of the literature on corruption Banerjee et al. (2012) observe that the main theoretical challenge in this area is

> the need to go beyond thinking of corruption as a generic form of moral hazard in organizations to the point where we can map different manifestations of corruption to different underlying environments, ... – the nature of the monitoring and the punishments *as well as the intrinsic motivation of the bureaucrats (e.g. how corruption fits into their moral compass)* [emphasis added].

This paper responds to their challenge by identifying discretion in the area of enforcement as one such area where moral motivations matter.

The framework of this paper, therefore, allows us to connect the important issue of morality to the link between corruption and red-tape.[8] In this prior literature, (excessive) red-tape is generated so that bureaucrats can extort more bribes (Tanzi, 1998). Or, in other models (Guriev, 2004) red-tape is necessary because it generates information about the agent's type. Bribery may be paid before the agent experiences the red-tape in order to reduce it (ex-ante corruption) or after the red-tape in order to suppress the information generated by it (ex-post corruption). The allure of bribery causes officials to generate excessive red-tape in order to be able to extract larger bribes. In this regard, our framework of red-tape is closer to Banerjee et al. (2012) in which it is, by definition, unnecessary and excessive.

Regardless of the definition of red-tape, our paper contributes to this literature in two distinct ways. First, we identify a completely new connection between red-tape and bribery: via the moral commitments of officials. That moral commitments of officials are to be blamed for red-tape, stands in sharp contrast to the prior literature in which it is self-interested officials who generate (excessive) red-tape in order to extract bribes. Second, in our framework bribery is collusive because both the

[8]Some scholars define red-tape as "when the bureaucrat implements more than the mandated amount of testing" Banerjee et al. (2012); that is, "red-tape" is by definition excessive. Whereas in other analyses regulators have incomplete information about which citizens are eligible for some public benefit and use red-tape to extract that information either via screening (Banerjee, 1997) or through testing (Guriev, 2004). Thus, in this framework red-tape is inefficient only when it is excessive; beyond what is necessary to determine a citizen's eligibility type.

officials and agents gain, whereas in Banerjee (1997) and Guriev (2004) officials extort bribes from citizens by threatening to entangle citizens in excessive red-tape.

Separately, our paper also extends the study of the causal link from discretion to corruption, which has been recognized for some time now (Klitgaard, 1988; Banfield, 1975; Banerjee et al., 2012; Decarolis et al., 2020; Coviello and Gagliarducci, 2017). Theoretically, Banerjee et al. (2012) develop a model of discretion in the context of procurement.[9] In their framework bureaucrats have more discretion if they can choose the prices (and other procurement rules), whereas less discretion is associated with a smaller choice set for the bureaucrat. In general they find that red-tape goes hand-in-hand with bribery (similar to Guriev (2004)).

Empirically, a few papers study discretion and corruption in the context of procurement (Decarolis et al., 2020; Bandiera et al., 2009). Both these studies utilize data from Italian government procurement. The former (Decarolis et al., 2020) finds that procurement auctions that allow for more discretion are generally chosen by officials who have been investigated for corruption. Whereas, Bandiera et al. (2009) studies the choice of a bureaucrat to purchase from a government approved supplier (where prices are fixed and publicly available) or negotiate a price on the market. In this context they find that, in order to avoid the "taint of corruption" bureaucrats often choose to purchase from a government approved supplier even when they can negotiate a lower price on the market (where kickbacks are possible).

Our paper is similar to these papers in that society faces a similar trade-off: discretion may have public benefit but it also increases opportunity for corruption, and hence regulator has to choose it carefully. Further, we also base our notion of discretion on a larger choice set for the official. However, it differs from these studies of corruption and discretion in three key ways. First, we focus on discretion in the context of enforcement rather than procurement. To our knowledge this is the first paper to analyze discretionary enforcement. Second, discretion is the result of voluntary choices of officials, similar to the empirical findings of Bandiera et al. (2009). Third, we study the interaction between moral commitments and discretion.

[9] In the context of procurement, discretion refers to negotiation auctions rather than open and transparent bidding, in service delivery, it refers to official selection as opposed to rule based selection of beneficiaries.

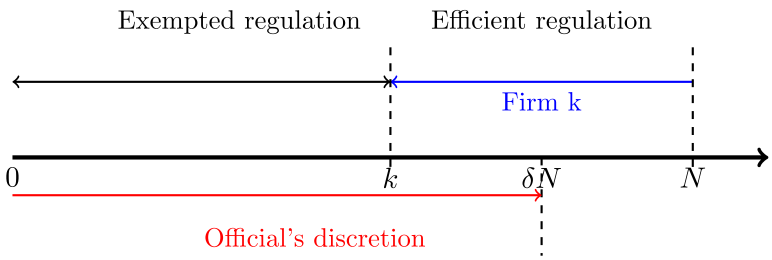
3 A model of discretion, temptation, and bribery

A cost minimizing firm may be required to satisfy a maximum of N rules or regulatory requirements. The cost of satisfying any given rule is c for all $i \in \{1, ..., N\}$. Firms are heterogeneous. A firm of type $k \in \{1, ..N\}$ is a firm such that the social benefit of complying with any rule $j < k$ is less than c. Accordingly, in a perfect world a regulator would implement a policy so that firm k only satisfies rules $\{k, k+1, ...N\}$, yielding a total cost of compliance $c(N-k) \equiv \mathcal{C}^k$. A full description and analysis of the welfare implications of these regulations are set aside until section 5.

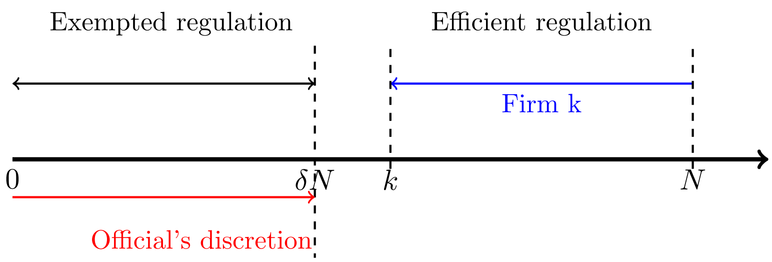
In a second best world the government cannot observe each firm's type k; hence, a policy in which a firm of type k only satisfies rules $k, ...N$ can only be implemented with some additional enforcement. To implement such a policy the government hires officials who (perfectly) observe a firm's type k. An official with discretionary power $\delta \in [0, 1]$ can exempt the firm from any rules that are within her discretionary power $i \in \{1, 2, ..\delta N\}$.[10] Thus, if she encounters a firm $k < \delta N$, she can grant the firm an exemption from following rules upto δN, if she so wished. To do so she makes a report $r \in \{k, ...\delta N\}$ which then requires the firm to follow rules r to N. However, if $k > \delta N$ the official cannot grant an exemption to any of the rules. The firm is "above the official's pay grade" and the official must require that it follows rules $\delta N ... k ... N$ at cost $\mathcal{C}^{\delta N} = c(N - \delta N)$ to the firm. Thus, too little discretion creates dead weight loss from the regulatory burden $c(k - \delta N)$. In either case, this information reported to the regulator as a message r for which the official receives a wage or piece rate of $w(N - r)$. Observe that the piece rate is designed to ensure that an honest official with sufficient discretion will always report $r = k$. Or, more generally an honest official always reports $r = \min\{\delta N, k\}$.

This regulatory framework is depicted below in figure (1). In illustration (a) the official possesses sufficient discretion so that an honest official would require the firm to follow rules $k, .., N$, whereas in (b) the official's discretion is too low $\delta N < k$ and the firm will be required to follow all rules $\delta N, ...N$, even though rules $\delta N, .., k$ are inefficient.

[10] For precision δN must be expressed as the floor function $\lfloor \delta N \rfloor$.



(a) **Sufficient discretion** (no red-tape)



(b) **Insufficient discretion** (red tape: $\delta N...K$)

Figure 1: Discretion and Regulation

If officials were honest, then it would be in the interest of the government if all officials chose $\delta = 1$ since an official would never grant an exemption when it was within her discretionary power, but when the firm was supposed to follow the rule given its type. That is, the official always exempts the firm from rules up to $j < k$, but requires the firm to comply with rules k through N.

When officials are corruptible, they can accept a bribe in exchange for exempting a firm from rules it is supposed to follow *if their discretionary power is sufficiently large*. Specifically, when $\delta N < k$, the official does not have sufficient discretionary power to grant the firm any exemptions in exchange for a bribe. Hence, society still faces a dead weight loss of $c(k - \delta N)$ from being forced to comply with $\{k, .., \delta N\}$ rules. When $\delta N \geq k$ an official can accept a bribe in exchange for exempting the firm from rules $k, ..., \delta N$.[11] We assume that the official's bargaining power is $\alpha \in (0, 1)$. Hence, any official with level of discretion δN can demand any bribe from a "menu" (or set) of bribes,

$$\mathcal{B}(\delta) = \{\alpha c(\delta N - k), \alpha c(\delta N - (k+1)), ., ., \alpha c\}$$

[11] We assume that if an official offers an exemption for some k it must offer an exemption for all $k' < k$ (but the reverse need not be true).

Note that $\alpha c(\delta N - k) > \alpha c(\delta N - (k+1)) > .... > \alpha c$ so that any bribe is denoted as,

$$b(\delta, r) = \begin{cases} \alpha c(r-k) \text{ if } \delta N > k \\ 0 \text{ if } \delta N \leq k \end{cases} \quad (1)$$

Finally, we denote the maximum bribe that can be received from a firm of type k by $b(\delta) = \max\{\alpha c(\delta N - k), 0\}$. Note that $b(\delta)$ is weakly increasing in δ because $c > 0$.

Given this regulatory framework (with possibly corruption) we specify the timing of decisions:

Period 1: Upon observing a specific firm's k, an official chooses her level of discretion δ potentially from some set of possible levels of discretion $\delta_1 < \delta_2$.

Period 2: The official chooses an outcome within that menu; specifically, whether to report $r = \min\{\delta N, k\}$ or if $\delta N > k$ whether to dishonestly report $r > k$ in exchange for a bribe.

Period 3: Bribes are transferred and wages are paid.

In choosing $\delta N > k$ in the first stage, an official generates for herself a menu consisting of the following set of options:

$$\mathcal{M}(\delta) = \mathcal{B}(\delta) \cup \{w\}; \quad (2)$$

that is, the set of bribes given her discretion or the honest report denoted by w. Whereas if she chooses $\delta N \leq k$ in the first stage, she chooses a "bribe free" menu:

$$\mathcal{M}(\delta) = \{w\}. \quad (3)$$

This choice framework is designed to capture many institutional settings. In many situations, officials can choose what types of positions or areas in which they choose to work, which determines their discretionary power. An official in a rural part of a developing nation will typically have a lot of discretion over choices. Whereas in more urban areas, officials may have less discretion because there is typically more oversight. Similarly, every few years the Baltimore City Department of Housing commissioner along with housing inspectors, decide whether to change the building requirements that are under their oversight or discretion (Samuel et al., 2021). Similarly, Potter (2019) provides both statistical and case-study evidence that bureaucrats exercise discretion with regard to the choice of rules on a case-by-case basis. Alternatively, the model can be interpreted as an individual's chosen career path (occupational choice), wherein an individual considering a career in public office can choose to join a department or division in which there is a lot of discretion, and another in which there is far less discretion. For example, in policing it is generally accepted that there is a high degree of discretion, whereas in other public career paths (such as a public school teacher), there is far less discretion.[12] Third, seeking more discretion may be interpreted as seeking a promotion or a transfer to a position with more or less discretion. Indeed, in most professions individuals can choose whether to seek a promotion or not (with a promotion bringing more discretion and authority). Finally, this choice framework is equivalent "dual problem" to one in which the official's discretion is given but where the official can choose the type of firm (k) that she wishes to evaluate. Officials often choose their departments or regions. For example, a city official who works as a building-code inspector can choose which neighborhood, or area of the city to inspect. If housing in each neighborhood is relatively homogeneous, then all homes in that neighborhood will be subject to the same regulations k.[13] Studying this "dual problem" here allows to translate the analysis of this section to that of the regulator's optimal choice of discretion (section 5). Our model is general so as as to capture these choice settings.

The choice of discretion here must, therefore, be viewed as a "high level" choice of discretion, rather than a more "immediate" day-to-day decision. Once that level of discretion is chosen, then in a subsequent period, the individual chooses whether or not to use that discretion honestly or whether to accept bribes. This first stage choice essentially limits the subsequent "choice set" of the individual. Assuming that individuals care about being tempted by bribery, an individual first chooses a level of discretion such as a career path (effectively chooses a choice set), that accounts for the future costs associated with remaining honest. Given this level of discretion, they then make a decision as to whether to be bribed among those available choices.

Before proceeding to introduce commitment and temptation we first study the incentives for bribery and discretion if this regulatory framework were analyzed within a standard Beckerian model. Note that given some δ as long as long as $\alpha c > w$, the officials' cost from granting an exemption for any regulation is always smaller than the bribe. Hence, when this inequality is

[12]See Development in India: Micro and Macro perspectives (Dev and Babu, 2015) See also Potter (2019) who extensively discusses ways in which bureaucrats choose their level of discretion.

[13]Section 5 relaxes this assumption to one in which the official (and regulator) know only the distribution of k.

satisfied a corruptible official always grants the maximal number of exemptions and reports $r = \delta N$ (in exchange for the largest possible bribe). Since the largest bribe is increasing in δ a utility maximizing official chooses $\delta = 1$. If $w \geq \alpha c$ (or the official is incorruptible) there is no incentive for bribery and the official always reports $r = k$. In this case also the official prefers $\delta = 1$ to maximize the wage $w(\delta N - k)$. Thus regardless of whether they are honest or corrupt, officials prefer more discretion. In order to make reference to this observation later, we summarize this insight in the following claim.

Claim 1 *Regardless of whether officials are honest or corrupt officials always prefer maximal discretion $\delta = 1$ in a standard Beckerian framework.*

Since officials are corrupt, sanctions for bribery could be effective. We assume that officials who demand bribes receive an expected penalty $s(\delta) = s\delta$. That is, the penalty is proportional to the level of discretion, δ. These sanctions need not be monetary but also could include social costs or moral costs associated with accepting bribes. These expected sanctions are incurred at the end of period 3.

4 Commitment and temptation: a positive analysis

We now conduct a positive analysis of the role of temptation and commitment within this regulatory framework. That is, we investigate how officials who have conflicting preferences will behave. In section 5 we study the regulator's welfare maximizing choices in the presence of such behavior. We model this two stage decision with temptation along the lines of Gul and Pesendorfer (2001). Accordingly, let $u(.)$ represent the official's commitment preferences, which in this case account fully for the full costs of bribery, including the sanctions s. And, let $v(.)$ represent the official's temptation preferences, which only include the (gross) benefits of bribery. Both these functions will be specified subsequently. Given some $u(.)$ and $v(.)$, an official chooses a menu δ (equivalently, a level of discretion) to maximize;[14]

$$U(\delta) \equiv \{u(.) + v(.) - max\{v()\}\}. \tag{4}$$

[14]To simplify notation we do not write $U(\mathcal{M}(\delta))$.

Given this choice of δ they then choose whether to accept a bribe from the set of bribes $\mathcal{B}(\delta)$ or honestly report the firm's type and receive $w(N - \min\{k, \delta N\})$.

The commitment preferences are:

$$u(r) = \begin{cases} \theta_u(b(\delta, r) - s(\delta) + w(N - r)) \text{ if } r \in (k, \delta N] \\ \theta_u w(N - r) \text{ if } r = min\{\delta N, k\} \end{cases}$$

while the official's temptation preferences are:

$$v(r) = \begin{cases} \theta_v(b(\delta, r) + w(N - r)) \text{ if } r \in (k, \delta N] \\ \theta_v w(N - r) \text{ if } r = min\{\delta N, k\}, \end{cases}$$

where $s(\delta)$ is the expected sanction for bribery, and θ_v and θ_u both positive constants. Note that bribery will not be feasible if $k > \delta N$ and in this case the official will have to report δN always.[15]

We solve the model via backward induction. That is, first we study the choices of an official *given* a fixed level of discretion δ. Next, we study the first-stage choice of discretion. As we show, every level of discretion corresponds to a menu. Thus, the official's choice *given* δ amounts to the second-stage choice of picking a utility maximizing outcome within a menu, and the choice of δ corresponds to the first-stage of choosing a menu.

4.1 Second-stage decisions

Second stage decisions are made given a menu or level of discretion chosen in period 1. We make a few observations and claims before analyzing these second stage decisions. First, observe that when $k \geq \delta N$ then bribery is not feasible and therefore cannot be tempting. When $k < \delta N$ although bribery is in the menu, it is not tempting unless bribery also maximizes $v(.)$. The following claim characterizes when bribery is tempting.

Claim 2 *Given some level of discretion δ and its associated menu $\mathcal{M}(\delta)$, if $k < \delta N$ the maximal bribe $b(\delta)$ is the tempting bribe.*

[15]Our interpretation of v and u reflects the fact that the temptation utility places no value on the sanctions for bribery whereas the commitment utility does value the sanctions associated with bribery. In an inter-temporal context if sanctions occur only after a bribe has been exchanged, then the discount factor is 0 for (myopic) temptation preferences and 1 under the commitment utility.

Next, observe that when bribery is feasible ($k < \delta N$), the only relevant bribe to consider is the maximal bribe $b(\delta)$. Recall that sanctions are fixed for a given level of discretion. The temptation cost is also only affected by the maximal bribe $b(\delta)$. Hence, if bribery is feasible, the only relevant dishonest choice is the maximal bribe so that 2 and 3 can be written as,

$$\mathcal{M}(\delta) = \begin{cases} \{w, b(\delta)\} \text{ if } k < \delta N \\ \{w\} \text{ if } k \geq \delta N. \end{cases}$$

Using this result we can now state the following condition which identifies whether bribery will be chosen for any given level of discretion:

Claim 3 *Consider any δ such that $\delta N > k$.*

- *If $s(\delta) - (\delta N - k)(\alpha c - w) > 0$, then reporting honestly is preferred to bribery only if*

$$\theta_u \geq \frac{\theta_v(\delta N - k)(\alpha c - w)}{s(\delta) - (\delta N - k)(\alpha c - w)} \equiv \theta_u^*$$

- *If $s(\delta) - (\delta N - k)(\alpha c - w) \leq 0$, then reporting honestly is never preferred to bribery.*

Further, when $s(\delta) - (\delta N - k)(\alpha c - w) > 0$, then θ_u^* is increasing in δ but decreasing in w.

We obtain three insights from claim (3). First, when $s(\delta)$ is sufficiently large officials with a higher θ_u will have a stronger incentive to be honest. Further, this threshold θ^* is increasing in δ so that as discretion increases a very high level of commitment is necessary for honesty to be part of the equilibrium choice. Second, if $w(\delta N - k) < b(\delta) - s(\delta)$ then for any θ_u bribery is always chosen. Thus, $w(\delta N - k) + s(\delta) > b(\delta)$ is necessary for honesty to be chosen in equilibrium. However, third, $w(\delta N - k) + s(\delta) > b(\delta)$ is not sufficient for honesty because of the temptation costs (associated with θ_v). These insights yield the following lemma.

Lemma 1 *In the presence of temptation bribery can only be deterred by setting the total sanctions $s(\delta) + w(\delta N - k) > b(\delta)$.*

4.2 First stage choice of δ

In the absence of corruption, full discretion minimizes the dead weight loss associated with requiring firms to comply with unnecessary requirements. Instead, if agents are completely self-interested (with no moral commitments), then due to bribery too many exemptions are granted, which also generates costs to society. Thus, a key issue concerning the first stage choice of δ, is to determine whether officials with a sufficiently high level of moral commitment will choose both a high level of discretion, but also remain honest.

In order to undertake this analysis we find it useful to make a brief observation. An official who chooses her level of discretion essentially determines how much the cost of temptation from bribery will be because the maximum bribe is determined by δ. In theory there are potentially N many levels of discretion that a bureaucrat can choose from. However, since a menu with a higher level of discretion implies a larger bribe (and larger temptation costs), we can restrict our study to the choice of any two arbitrary levels of discretion $\delta_1 < \delta_2$.

Accordingly, consider two levels of discretion with $\delta_2 N > k \geq \delta_1 N$ so that while bribery is always feasible at δ_2 it is not feasible at δ_1. The relationship between the preference for discretion, commitment, and bribery is characterized below:

Proposition 1 *There exists a $\theta_u^*(\delta_2)$ such that if $\theta_u \geq \theta_u^*(\delta_2)$, then the official always prefers less discretion without bribery; that is, δ_1 to δ_2. If $\theta_u < \theta_u^*(\delta_2)$, then the official prefers δ_1 if*

$$w(\delta_2 - \delta_1)N \geq \alpha c(\delta_2 N - k) - s(\delta_2),$$

otherwise the official chooses δ_2 and accepts bribes.

The above result reveals several aspects about the relationship between commitment, temptation costs, and bribery. First, when θ_u is very high, the official always behaves honestly, but in this case will choose less discretion. Intuitively, because temptation costs are increasing in the level of discretion, a highly committed (honest) official always behaves honestly. But, since there is more temptation with higher discretion, she chooses less discretion to lower her temptation costs. In concrete terms the result implies that morally committed individuals who would be honest if faced with the possibility of bribery, will actually avoid high-temptation situations and will instead choose ones where there is little discretion and less scope for bribery to minimize temptation costs. Thus, the choice of highly committed honest officials creates welfare losses since the firm must now follow unnecessary rules $\delta_1 N...k$ at cost c per rule.

Second, if θ_u is below $\theta_u^*(\delta_2)$, then the official chooses the lower level of discretion with no bribery when the wage is sufficiently large. When commitment levels are very low or bribery not feasible at δ_1, then decisions concerning δ are made within a Beckerian world, wherein the official chooses a higher level of discretion and its associated larger bribe if the marginal gain is greater than the marginal increase in sanctions. These results and ideas are illustrated in figure (2) below.

From this analysis we draw two implications. First, the very individuals who would be honest in a high discretion environment, will also avoid those environments to avoid temptation costs. This theoretical result is similar to the empirical findings of Bandiera et al. (2009) who finds that bureaucrats choose less discretionary procurement methods in order to avoid any semblance of corruption. The second result concerning the effect of wages is complicated. Specifically, raising wages lowers the threshold level of commitment above which individuals remain honest (θ_u^*). This implies that for larger range of θ_u, individuals would remain honest, but it also implies that those very individuals will choose less discretion to avoid temptation costs. Similarly, although higher wages can eliminate bribery and induce more honesty, they introduce dead weight loss from excessive regulation. Specifically, when wages are raised to satisfy the condition in proposition (1), the official prefers less discretion to reduce or avoid temptation costs. Thus, raising wages to eliminate bribery can impose a welfare burden on firms.

Finally, these results offer insight into answering an important question: can high discretion and honesty be achieved simultaneously? The result shows that this cannot be achieved if wages are the same for both levels of discretion. If however, wages can be chosen so that they are higher when discretion is higher, then it may be possible to induce officials to choose honesty along with high levels of discretion. Thus, our model offers a novel reason for why officials with higher levels of discretion should be paid more. Even ceteris paribus (i.e. not because they are more productive for example), officials with more discretion face more temptation for corruption, and therefore will need to be paid higher wages to offset the greater temptation (and temptation costs) that they experience.

Proposition (1) also provides us with a condition on wages to ensure that bribery is not chosen.

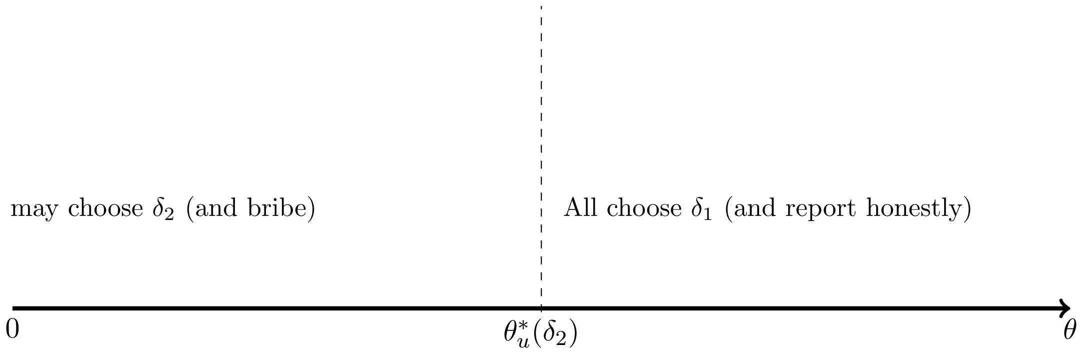


Figure 2: Commitment and bribery

Specifically, if $w \geq \frac{\alpha c(\delta_2 N - k) - s(\delta_2)}{(N - \delta_1 N)}$, then officials choose δ_1 and do not take bribes. Importantly, even though officials with more discretion receive a larger wage (because w is proportional to δ), they cannot be encouraged to remain honest at the higher level of discretion. Instead, the wage encourages officials to choose a lower level of discretion with more red tape. Finally, note that this wage is not affected by θ_v or θ_u so that officials with higher temptation costs (or commitment) need not be offered a higher (lower) wage to encourage them to remain honest.

5 Welfare Analysis

We now study the policy decisions of a welfare maximizing regulator. Specifically, we investigate how a welfare maximizing regulator balances the trade-off between discretion, red-tape, and bribery. To investigate this issue, let $g > 0$ be the social benefit to each regulation that a firm is supposed to comply with. That is, a firm of type k if fully compliant generates a social benefit $g(N - k)$, where $g > c$ so that compliance is socially beneficial. If firms' k is known then the optimal level of discretion is $\delta = k/N$ so that there is no scope for bribery, temptation is eliminated, and there is no red-tape. Thus, under perfect information the "first-best" level of discretion can achieved.

Assume that the regulator does not know each firm's type k. Rather, k is uniformly distributed: $k \sim U[\underline{k}, N]$ and the regulator only knows this distribution. The regulator therefore must choose a δ given the expected value of k, denoted by $E(k)$. After being granted a level of discretion δ, the official observes the firm's k and therefore may or may not be able or willing to accept a bribe. Since the regulator only knows the distribution of k, welfare now depends on the expected bribe or red-tape costs. To simplify our analysis we let $s(\delta) = s\delta$ and normalize $\theta_u = 1$. By normalizing θ_u

we prevent biasing our results in favor of bribery relative to the rest of the literature.[16]

To solve this welfare maximization problem, we first identify conditions under which bribery will be feasible. Then we consider whether bribery will occur, given that it is feasible. Given the above structure, bribery will be feasible if the official has enough discretion to accept a bribe from a firm with the lowest k; that is, if given enough discretion so that $\delta N > \underline{k}$. Thus, if the regulator chooses $\delta > \frac{\underline{k}}{N}$ there will be some firms $k \in (\underline{k}, \delta N)$ for whom the official will have enough discretion to be bribed so that bribery is on the "menu," which they find tempting. But, a welfare maximizing regulator will never choose a $\delta < \frac{\underline{k}}{N}$ because discretion can be raised up to $\delta = \frac{\underline{k}}{N}$ without encouraging bribery. Thus, the regulator always chooses levels of discretion which include the possibility of bribery so that we may restrict attention to those values of δ at or above $\frac{\underline{k}}{N}$.

Whether they actually accept bribes from such firms will depend on whether they succumb to temptation, which depends on their temptation and self control preferences. Utilizing claim (3) and the fact that $\theta_u = 1$, observe that bribery occurs for a firm of type k if

$$s\delta - (\delta N - k)(\alpha c - w) < \theta_v(\delta N - k)(\alpha c - w).$$

That is, bribery occurs for firms with

$$k \leq \delta N - \frac{s\delta}{(\alpha c - w)(1 + \theta_v)}.$$

Let

$$\lambda = \frac{s}{(\alpha c - w)(1 + \theta_v)},$$

then bribery occurs if,

$$k \leq \delta(N - \lambda). \tag{5}$$

Thus, firms with $k \in (\underline{k}, \delta(N - \lambda))$ will be able to bribe the official, whereas those with $k \in (\delta(N - \lambda), \delta N)$ will not be able to bribe. However, if the chosen level of δ is too low then $(\underline{k}, \delta(N - \lambda))$ may be an empty set. This insight (along with 5) allows us to identify the following condition under

[16] Specifically, bribes and sanctions are welfare neutral (Mookherjee and Png, 1995) because they are typically transfers between the firm to the official (and sanctions are transfers from the official to the planner). However, here because a bureaucrat who accepts a bribe achieves a welfare of $\theta_u(b(\delta) - s(\delta))$, if $\theta_u > 1$, bribes (and sanctions) would not be transfers and may result in net positive welfare.

which bribery never occurs. If at the highest level of discretion, $\delta = 1$, a firm of the lowest type $\underline{k}$ (who is willing to pay the largest possible bribe) cannot bribe such an official (because 5 is violated), then bribery will never occur for any other level of discretion or firm type (i.e. $(\underline{k}, \delta(N - \lambda))$ is an empty set for any δ). Utilizing this insight yields the following condition.

Condition 1

$$\lambda \geq N - \underline{k}.$$

Observe that $N - \underline{k}$ is a measure of the variance of firm types. Thus, the condition finds that if the variance of firms' types is sufficiently small then bribery will not occur. When condition (1) is violated then bribery *may* occur for at least some low k firms if δ is large enough; that is, if inequality 5 is satisfied at $\underline{k}$. This yields the following result.

Lemma 2 *If condition (1) is violated, then there exists a* $\tilde{\delta}$ *such that (a)* $\tilde{\delta} \in (\frac{\underline{k}}{N}, 1)$ *and (b) bribery is tempting but not chosen for any level of discretion* $\in (\frac{\underline{k}}{N}, \tilde{\delta})$*, and is chosen for some* k *if* $\delta > \tilde{\delta}$*. This threshold level of discretion is,*

$$\tilde{\delta} = \frac{\underline{k}}{N - \lambda}$$

Lemma (2) implies that there is a range of discretion levels over which bribery is tempting but not chosen (and above which it is chosen). A visual depiction of condition (1) and this lemma is provided in figure (3) for two possible distribution supports of k; $k \sim U[\underline{k}_1, N]$ and $k \sim U[\underline{k}_2, N]$, with $\underline{k}_1 > \underline{k}_2$. The figure allows us to illustrate several aspects concerning bribery and temptation costs. First, note that the welfare maximizing regulator always chooses a δ above $\overline{k}_i/N$. Second, as δ increases the range over which bribery occurs increases and the range over which bribery is tempting but not chosen also increases. Third, recall that bribery occurs only if $\underline{k}_i < \delta(N - \lambda)$. At $\underline{k}_1$ condition (1) is satisfied because even if the official were to be given full discretion (at $\delta = 1$) bribery would not occur because $\underline{k}_1 > (N - \lambda)$. Thus, there does not exist $\tilde{\delta}$ above which bribery occurs. Instead, for the support $k \sim U[\underline{k}_2, N]$ such a $\tilde{\delta}$ does exist, therefore, bribery will occur for any level of discretion chosen between $\tilde{\delta}$ and 1. Finally, note that as δ decreases the range of firms over which bribery occurs (between $\underline{k}$ and $\delta(N - \lambda)$) also falls. However, red-tape also increases in the sense that more firms have unnecessary regulations to follow. Thus, in contrast to other models more red-tape is actually associated with less bribery because it reduces the range of temptation for the official.

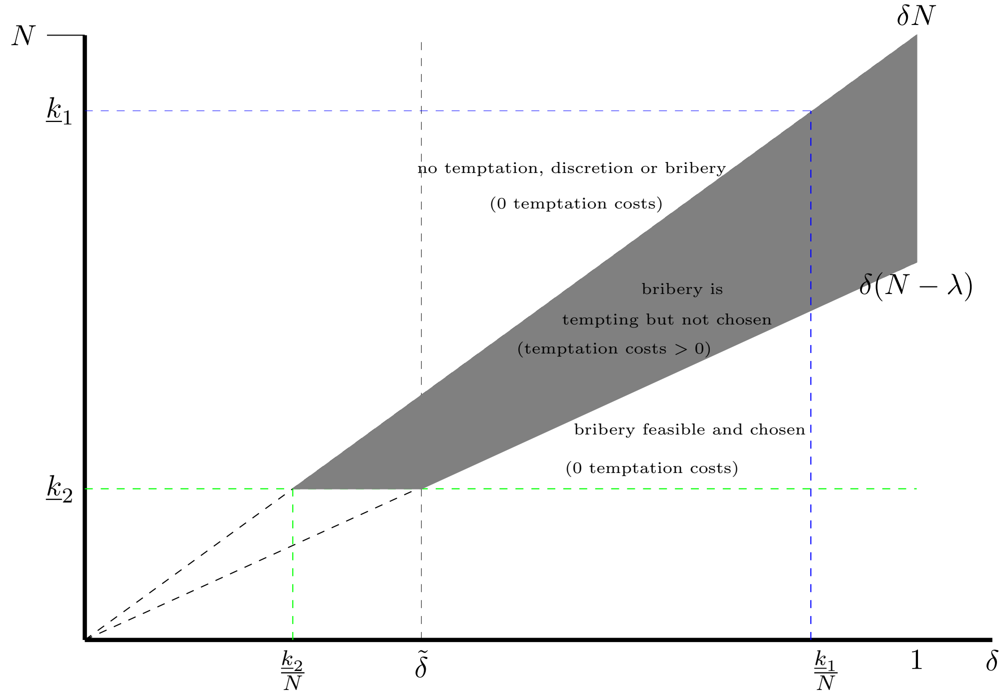


Figure 3: Condition (1) satisfied (violated) at $\underline{k}_1$ ($\underline{k}_2$)

Utilizing the above insights, it follows that for $k \in (\delta(N-\lambda), \delta N)$, bribery is feasible, but it is not exchanged in equilibrium. Of course, $\delta(N-\lambda)$ can be smaller than $\underline{k}$ in which case bribery is not feasible for any k. Therefore, define

$$\Delta = max\{\underline{k}, \delta(N-\lambda)\}$$

Then (after a few rounds of algebra, which is provided in the appendix) and utilizing B and NB as subscripts to denote welfare with and without bribery, welfare can be written as:

$$\begin{aligned} G_B &= g[N - E(k|k \geq \Delta)]p(k \geq \Delta) \\ &-c[N-E(k|k \geq \delta N)]p(k \geq \delta N) - \underbrace{c[E(k|k \geq \delta N) - \delta N]p(k \geq \delta N)}_{\text{red-tape costs}} - c[N-E(k|k \in (\Delta, \delta N)]p(k \in (\Delta, \delta N)) \\ &+ \theta_v w(N - E(k|k \geq \Delta))p(k \geq \Delta) \\ &- \underbrace{\theta_v \left(\alpha c(\delta N - E(k|k \in (\Delta, \delta N))p(k \in \Delta, \delta N) + w(N - \delta N)p(k \geq \delta N)\right)}_{\text{temptation costs}}. \quad (6) \end{aligned}$$

Since the regulator knows only the distribution of firm types k, all payoffs are in expected terms. The first term is the gain from compliance, since all firms above Δ comply. The second term in equation (6) is the compliance costs for firms above δN. Because the official may not have full discretion this amounts to the region with too little discretion, leading to red tape costs. These red tape costs are identified in (6). The fourth term includes costs associated with firms below (within) the official's discretion. Thus, these costs are in some sense acceptable welfare costs. The fifth term is the official's gain (wage) from requiring firms to comply. Finally, the last term is the official's temptation costs.

The last term deserves further discussion. In other contexts bribes and sanctions do not appear in a welfare function because the bribes are transfers between official and firm and sanctions are transfers between official and regulator. By contrast, here bribes appear in the welfare function because for firms with $k \in (\delta(N-\lambda), \delta N))$ bribery is tempting but not chosen. The temptation (control) costs which are proportionate to θ_v and the size of the bribe now influences the welfare function.

Using this expression for welfare, we can now characterize the welfare maximizing level of discretion.

Lemma 3 *Let δ_s be the welfare maximizing level of discretion.*

1. *If condition (1) is satisfied, then*

$$\delta_s = \frac{cN + \theta_v(\alpha \underline{k} + 2Nw)}{cN + \theta_v(\alpha N + 2Nw)} \in (\frac{\underline{k}}{N}, 1)$$

.

2. *If condition (1) is violated, then there exists thresholds $g_2 > g_1 > 0$ and a $\tilde{\delta}_1 > 0$ such that if $\tilde{\delta} \leq \tilde{\delta}_1$ and if*

   a. *$g > g_2$, then $\delta_s = \tilde{\delta}$*

   b. *$g_1 \leq g \leq g_2$, then $\delta_s \in (\tilde{\delta}, 1)$.*

   c. *$g < g_1$, then $\delta_s = 1$.*

   If $\delta > \tilde{\delta}_1$ and $g \geq g_2$, then

$$\delta_s = \frac{cN + \theta_v(\alpha \underline{k} + 2Nw)}{cN + \theta_v(\alpha N + 2Nw)} \in (\frac{\underline{k}}{N}, 1).$$

The above proposition characterizes the optimal level of discretion. An immediate implication of the above result is that in many cases a welfare maximizing regulator will wish to choose a level of discretion that does not permit bribery. Specifically, the regulator chooses a δ so that officials incur temptation costs "in equilibrium."

Proposition 2 *The welfare maximizing level of discretion possesses the following properties concerning temptation costs and discretion:*

- *Suppose condition (1) is satisfied, then at the optimal level of discretion there is no bribery but officials must incur temptation costs at the optimum policy $\delta_s \in \left(\frac{\underline{k}}{N}, 1\right)$. Further, δ_s is decreasing in θ_v and N and increasing in w.*

- *If condition (1) is violated, then if g is sufficiently large ($g > g_2$), then the socially optimal level of discretion does not allow bribery but officials must incur temptation costs. In this case δ_s is decreasing in θ_v and N and increasing in w. If $g < g_2$, then unless $\tilde{\delta} > \tilde{\delta}_1$, bribery is permitted. When g is sufficiently small ($< g_1$) and $\tilde{\delta} \leq \tilde{\delta}_1$ then $\delta = 1$ and bribery occurs but temptation costs are minimized.*

The two preceding results yield several insights. First, consider the case where condition (1) satisfied. Thus, when the variance of firm types k is low, it is not socially optimal to allow bribery. In this case, however, the presence of temptation still matters and an increase in θ_v reduces the socially optimal level of discretion. That is, when bribery is more tempting the regulator will need to reduce the official's discretion. But as a result of this lower δ firms face a higher regulatory burden (or red-tape). Thus, interestingly more red-tape serves as a remedy for temptation from bribery.

When condition (1) is violated, bribery is tempting. As long as the gains from regulation (g) are sufficiently large the regulator does not find it optimal to allow bribery, but officials are burdened with temptation costs. Indeed, in this second case, the regulator chooses the lowest possible level of discretion that is needed to eliminate bribery. However, in doing so it increases the regulatory burden (red-tape) on firms because firms must now abide by unnecessary regulations. Thus, again more red-tape serves to reduce the temptation from bribery.

The final case in lemma 3 (case c) is counter-intuitive. This case occurs when gains from regulation are low (g small) and the threshold discretion below which bribery is tempting but not indulged in small. In such instances, because compliance provides minimal gains the regulator minimizes red-tape costs by choosing full discretion. This policy also has the added benefit of reducing temptation costs.

The comparative statics in the case if $g > g_2$ (or (1) satisfied) are insightful from a policy standpoint. An increase in θ_v requires less discretion. This is not entirely surprising, if temptation is stronger then the welfare maximizing regulator must choose a lower level of discretion. An increase in w raises δ so that by increasing wages the regulator can raise the level of discretion and lower temptation costs. Finally, an increase in the total number of potential regulations reduces δ. That is, in industries where many regulations are needed (e.g. pharmaceuticals) there needs to be less rather than more discretion.

Finally, we investigate how much discretion an official would choose for themselves under asymmetric information of firm types. Here we use π_B and π_{NB} to denote the official's payoff under bribery B (when condition (1) is violated) and no-bribery NB (when condition (1) is satisfied).[17] Consider a model in which the official only knows the distribution of k when choosing their own δ, and then observes each firm's type subsequently. In this case, the official's expected payoff function when condition (1) is satisfied is

$$\pi_{NB} \equiv (1+\theta_v)w(N-E(k)) - \theta_v \left(\frac{\alpha c(\delta N - \underline{k})^2}{2(N-\underline{k})} + \frac{w(N-\delta N)^2}{N-\underline{k}} \right).$$

The question we investigate is: how does the official's discretionary choice differ from δ_s? As we now show, in most cases the official's discretionary choice differs from δ_s.

Proposition 3 *If condition (1) is satisfied so that bribery is tempting but not feasible. The official chooses a level of discretion,*

$$\delta_o = \frac{\alpha c\underline{k} + 2wN}{\alpha cN + 2wN} < \delta_s.$$

In the case where condition (1) is satisfied, it is insightful to note that the official chooses too little discretion relative to the planner. Intuitively, because bribes are not accepted, more discretion only increases her temptation costs. Thus, the official prefers to reduce her discretion in order to lower their temptation costs.

If condition (1) is violated then the socially optimal δ is difficult to characterize and depends on several conditions (see proposition (3)). Hence, it is not straightforward to characterize this case. Indeed, in this case the official may choose too much discretion relative to the planner. For example, if θ_v is large, then it can be shown that the official chooses too much discretion relative to the planner. Figure (4) shows such a case where the official maximizes π_B at $\delta_0 = 1$ while welfare maximization maximizes G_B at $\delta < 1$. Finally, in some instances an official may even choose the level that is socially optimal.

[17]The appendix provides a derivation of these expressions.

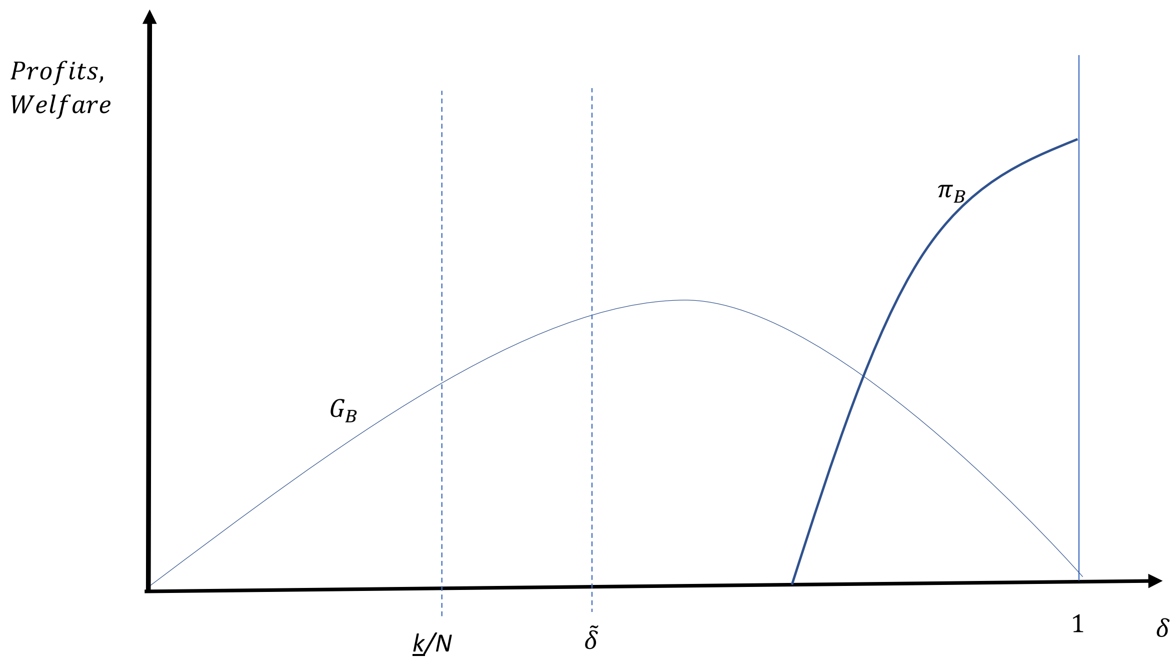


Figure 4: Parameters: $N = 10, \underline{k} = 3, \theta_v = 8, \alpha = .5, c = 4, g = 20, s = 2, w = 1.5$

6 Conclusion

Admitting moral preferences has been a concern for economists at least since Sen (1977) highlighted the importance of this issue. Regarding this issue, Frank (1987) asks the question:

> If homo economicus could choose his own utility function, would he want one with a conscience?

Our analysis studies a parallel, related, question: *if officials could choose their level of discretion (where more discretion yields greater temptation for bribes), how much discretion would they choose?*

In doing so, this paper connects two separate themes in the study of corruption: corruption as a moral dilemma, and corruption as a result of too much official discretion. The assertion that corruption must be viewed as a moral dilemma dates at least to Noonan (1987) and, more recently by several scholars in Nichols and Robertson (2017) and Greene (2014). These authors argue that the decision to be corrupt often results from an internal moral conflict in which a preference for being honest conflicts other more selfish or myopic choices. Separately, Klitgaard (1988) and Banfield

(1975) famously observed that corruption occurs when officials possess too much discretion with insufficient accountability and transparency. Our analysis connects these two ideas by recognizing that more discretion leads to greater opportunities for corruption, which in turn exacerbates the moral conflict faced by officials.

We analyze this issue using the model of choice developed by Gul and Pesendorfer (2001). This analysis yields three key findings. First, officials who are most committed to remaining honest, are also those who will seek less discretion to avoid the temptation to accept a bribe. Thus, those who "go by the book" and generate unnecessary red-tape will often be the honest officials. This finding is related to Henke et al. (2022) who finds incorruptible agents have higher participation costs relative to those who are corruptible. In our paper honest agents do face a higher temptation cost, but they can avoid that cost by generating more red-tape! Second, we find that a welfare maximizing regulator would ideally like to choose a policy in which officials have a high degree of commitment (high θ_u) and a lot of discretion (high δ). Thus, at the welfare maximizing policy they remain honest but also incur temptation costs. Third, in general honest officials will choose less discretion than a welfare maximizing regulator, or will avoid such "high-discretion" positions altogether. The idea that officials choose less discretion is consistent with Bandiera et al. (2009) who find, in the context of procurement, that officials choose less discretionary procurement methods in order to avoid any appearance of corruption.

Although our work focused on the bureaucratic crime of bribery, our paper is related to behavioral or non-standard models of crime (see van Winden and Ash (2012) for an insightful review of this literature). Viewed from this context, the conceptual idea that is most relevant to our work is the "present biased" or the time inconsistent nature of criminal behavior. That is, many crimes such as running red-lights, are impulsive (Delgado et al., 2005). By accounting for the present bias impulse of such crimes, it can be shown that the optimal sanction for such crimes must be raised above what would be prescribed in a standard Beckerian" framework. Accordingly, behavioral models that account for such present bias can offer valuable policy insights to deter such crimes.

The analytic foundation of these models with present bias is usually hyperbolic discounting, a non-expected utility model of choice that violates the independence axiom. In contrast, the framework that we use (Gul and Pesendorfer, 2001) is more standard in that the underlying preferences satisfy the axioms of expected utility theory (i.e. they are VonNeumann and Morgenstern (VNM) preferences). Further, this framework allows for both present bias (in the temptation preferences), but also commitment so that individuals may use commitment devices (such as choosing a particular menu), in order to prevent such (ex-post) impulsive behavior ex-ante (i.e. to avoid the time-inconsistency of their decision).

The *GF* framework applied to crime in other contexts besides bribery has generated novel findings. Importantly, although raising the sanction can deter crime, it increases the foregone "temptation cost," thereby raising the cost of being honest (Cervellati and Vanin, 2013).[18] While these findings are insightful, as we show elsewhere it misses an important feature - the role of choosing a menu to avoid temptation (Mishra and Samuel, 2023). In contrast, our paper allows for both commitment or self-control and temptation, which to our knowledge is the only paper to do so within this framework.

Accordingly, we believe that our work suggests several fruitful avenues for future research on corruption but also compliance and crime more broadly. First, in our framework we do not clarify exactly how discretion in chosen. In her work "Bending the Rules," Potter (2019) provides detailed case-level evidence of how officials use various procedural means to essentially choose their own level of discretion or oversight. We believe that future work should investigate and model these procedures more explicitly. Second, the welfare implications of self-control costs need to investigated more carefully especially since discretion imposes self-control costs on honest officials even while it enhances efficiency. Third, it has been previously observed that "red-tape" is often the cause of bribery even though it can be beneficial Guriev (2004). Here we find a novel source of red-tape; namely, that it is the outcome of honest bureaucrats who use it as a commitment device to avoid temptation. This suggests that more work needs to be done to understand the links between corruption and red-tape. Finally, our paper suggests the menu's design can be structured to achieve desired outcomes in agents, in addition to standard ex-post incentives. We leave it to future work to investigate these issues more carefully.

[18]There is now a very limited but growing literature applying the framework proposed by (Gul and Pesendorfer, 2001) to various other economic questions besides crime (Esteban and Miyagawa (2006), Esteban et al. (2007)). These papers focus on a variety of the pricing decisions of firms when consumers possess such preferences.

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7 Online Appendix

7.1 Claim 2

Proof. The goal of claim (2) is to establish that when bribery is feasible, then the maximal bribe $b(\delta)$ maximizes $v(.)$ and so is the tempting bribe.

For a given δ, if $k \geq \delta N$ bribery is not feasible, hence the official reports δN and receives a wage of $w(N - \delta N)$ with a utility of $\theta_u w(N - \delta N)$. Since bribery is not an element of this menu, there are no temptation costs from bribery.

If $k < \delta N$, then bribery is tempting if and only if dishonestly reporting $r > k$ in exchange for a bribe maximizes $v(.)$. Choosing r to maximize $v(.) = \theta_v(b(\delta N, r) + w(N - r)) = \theta_v(\alpha c(r - k) + w(N - r)$ yields the first order condition

$$\alpha c - w.$$

When $\alpha c > w$, $v(.)$ is increasing in r so that so that the maximal bribe is tempting. Whereas if $\alpha c \leq w$ then bribery does not maximize $v(.)$ and the official will report $r = k$.

■

Now that we have established that bribery is tempting, the official's choice problem is to choose a report r to maximize,

$$max_{r\in\{k,k+1,...\delta N\}}\{(\theta_u+\theta_v)w(N-k)-\theta_v b(\delta),(\theta_u+\theta_v)(b(\delta,k+1)+w(N-(k+1))-s(\delta))-\theta_v b(\delta)....$$

$$\theta_u(b(\delta)-s(\delta))\} \quad (7)$$

Observe that the sanctions are identical and further that the temptation cost is $\theta_v[\alpha c(\delta N - k) + w(N - \delta N)]$ for any bribe choice. Hence, if the official is going to accept a bribe they will choose either the maximal bribe $b(\delta)$ or w. Hence, we may reduce the menus to those in equations (2) and (3).

7.2 Proof of Claim 3

Proof. Given any menu $\mathcal{M}(\delta)$ if $\delta N > k$, the utility from each choice $\{w, b(\delta)\}$ within that menu is,

$$U(\delta) = \theta_u(\alpha c(\delta N - k) - s(\delta) + w(N - \delta N)) \text{ if } r = b(\delta)$$

$$(\theta_u + \theta_v)w(N - k) - \theta_v(\alpha c(\delta N - k) + w(N - \delta N) \text{ if } r = w,$$

where $\alpha c(\delta N - k)$ is the bribe $b(\delta)$. Thus, reporting k honestly (i.e. no bribery) is preferred if and only if,

$$\theta_u\left[w(\delta N - k) - (b(\delta) - s(\delta))\right] > \theta_v\left[b(\delta) + w(k - \delta N)\right],$$

or

$$\theta_u\left[s(\delta) - (\delta N - k)(\alpha c - w)\right] > \theta_v\left[\delta N - k)(\alpha c - w)\right].$$

When $s(\delta) > (\delta N - k)(\alpha c - w)$, then solving this expression for θ_u yields,

$$\theta_u \geq \frac{\theta_v(b(\delta) - w(\delta N - k))}{w(\delta N - k) - (b(\delta N) - s(\delta))} \equiv \theta_u^*.$$

Instead, when $s(\delta) - (\delta N - k)(\alpha c - w) \leq 0$, then clearly for any value of θ_u honest reporting is not preferred. Finally,a straightforward derivative with respect to δ at $b = \alpha c(\delta N - k)$ obtains the final result that θ_u^* is increasing in δ as long as $s'(\delta)$ is sufficiently small, such as if s is a linear function of δ: $s(\delta) = s\delta$. ■

7.3 Proof of Proposition 1

Consider two levels of discretion $\delta_2 N > k > \delta_1 N$. If δ_2 is chosen the utility from that menu is

$$U(\delta_2) = \max\{\theta_u(\alpha c(\delta_2 N - k) - s(\delta_2) + w(N - \delta_2 N)), (\theta_u + \theta_v)w(N - k) - \theta_v(\alpha c(\delta_2 N - k) + w(N - \delta_2 N)\},$$

depending on whether bribery or honesty is preferred under the conditions provided in claim 3.

If δ_1 is chosen, the utility is

$$U(\delta_1) = \mathcal{M}(\delta_1) = \{\theta_u w(N - \delta_1 N)\}.$$

From claim (3) we know that if $\theta_u \geq \theta_u^*(\delta_2)$, the official remains honest even when bribery is tempting. However, this implies that she always prefers δ_1 to δ_2 because she gets a higher reward $\theta_u w(N - \delta_1 N) > \theta_u w(N - k)$ without the temptation costs $\theta_v(w(N - k) - \alpha c(\delta_2 N - k) - w(N - \delta_2 N)) < 0$. Thus, she chooses δ_1.

If $\theta_u < \theta_u^*(\delta_2)$, then bribery is preferred conditional on choosing δ_2. Thus, the choice between the two discretion levels implies that if w is sufficiently large, the firm prefers less discretion and honesty to bribery. This yields the condition in proposition (1).

7.4 Proof of Lemma 2

Proof. First recall that bribery occurs if given some δ there are firms who type satisfies $k \leq \delta(N - \lambda)$. A bureaucrat who encounters firm in this range also finds bribery tempting because $k \leq \delta(N - \lambda) < \delta N$. Second, for such a range of firms to exist, the interval $[\underline{k}, \delta(N - \lambda)]$ must be non-empty. This interval is non-empty if and only if

$$\delta(N - \lambda) > \underline{k},$$

which is true if and only if,

$$\delta > \frac{\underline{k}}{(N-\lambda)} \equiv \tilde{\delta}.$$

Since $\delta \leq 1$, a necessary condition for the above interval to be non-empty for at least some δ is that,

$$(N-\lambda) \geq \underline{k},$$

which is inequality (5) (in the text) evaluated at $\delta = 1$. Thus, if

$$\underline{k} < N - \lambda$$

is satisfied, then there exists a $\tilde{\delta}$ which is in the interval $(\frac{\underline{k}}{N}, 1)$ such that bribery occurs for firms whose type k is in a positive neighborhood of $\underline{k}$ when the official's level of discretion is above, $\delta > \tilde{\delta}$.

■

7.5 Derivation of the expression for welfare

Welfare can be written as:

$$\begin{aligned} g[N - E(k|k \geq \Delta)]p(k \geq \Delta) - c(N - \delta N)p(k \geq \delta N) - c[N - E(k|k \in (\Delta, \delta N)]p(k \in (\Delta, \delta N)) \\ + (1+\theta_v)w(N - E(k|k \geq \Delta))p(k \geq \Delta) - w(N - E(k|k \geq \Delta))p(k \geq \Delta) \\ - \theta_v \alpha c(\delta N - E(k|k \in \Delta, \delta N))p(k \in \Delta, \delta N)) \\ + \theta_u(\alpha c(\delta N - E(k|k \leq \Delta)) - s\delta)p(k \leq \Delta) \\ + s\delta p(k \leq \Delta) \\ - \theta_v w(N - \delta N)p(k \geq \delta N). \quad (8) \end{aligned}$$

Canceling terms in (8) yields,

$$\begin{aligned} g[N - E(k|k \geq \Delta)]p(k \geq \Delta) - c(N - \delta N)p(k \geq \delta N) - c[N - E(k|k \in (\Delta, \delta N)]p(k \in (\Delta, \delta N)) \\ + \theta_v w(N - E(k|k \geq \Delta))p(k \geq \Delta) \\ - \theta_v \left(\alpha c(\delta N - E(k|k \in (\Delta, \delta N))p(k \in \Delta, \delta N) + w(N - \delta N)p(k \geq \delta N)\right). \quad (9) \end{aligned}$$

Expanding the second term of the previous equation allows us to identify the red tape costs from welfare:

$$
\begin{aligned}
& g[N - E(k|k \geq \Delta)]p(k \geq \Delta) \\
-c[N-E(k|k \geq \delta N)]p(k \geq \delta N) - & \underbrace{c[E(k|k \geq \delta N) - \delta N]p(k \geq \delta N)}_{\text{red-tape costs}} - c[N-E(k|k \in (\Delta, \delta N)]p(k \in (\Delta, \delta N)) \\
& + \theta_v w(N - E(k|k \geq \Delta))p(k \geq \Delta) \\
& - \underbrace{\theta_v \left(\alpha c(\delta N - E(k|k \in (\Delta, \delta N))p(k \in \Delta, \delta N) + w(N - \delta N)p(k \geq \delta N)\right)}_{\text{temptation costs}}. \quad (10)
\end{aligned}
$$

7.6 Proof of Lemma 3

Proof. If Condition (1) is satisfied, then $\Delta = \underline{k}$ and there is no bribery for any value of δ. So welfare simplifies to,

$$
\begin{aligned}
G_{NB} = g(N - E(k)) - c\frac{(N - \delta N)^2}{N - \underline{k}} - c\left(N - \frac{\underline{k} + \delta N}{2}\right)\frac{\delta N - \underline{k}}{N - \underline{k}} \\
- \theta_v \alpha c\left(\delta N - \frac{\underline{k} + \delta N}{2}\right)\frac{\delta N - \underline{k}}{N - \underline{k}} - \theta_v \frac{w(N - \delta N)^2}{N - \underline{k}} + \theta_v w(N - E(k), \quad (11)
\end{aligned}
$$

which simplifies to,

$$
\begin{aligned}
G_{NB} = g(N - E(k)) - c\frac{(N - \delta N)^2}{N - \underline{k}} - c\left(N - \frac{\underline{k} + \delta N}{2}\right)\frac{\delta N - \underline{k}}{N - \underline{k}} \\
- \theta_v\left(\alpha c\frac{(\delta N - \underline{k})^2}{2(N - \underline{k})} + \frac{w(N - \delta N)^2}{N - \underline{k}}\right) + \theta_v w(N - E(k)). \quad (12)
\end{aligned}
$$

A few steps of algebra reveals that,

$$
\frac{\partial G_{NB}}{\partial \delta} = \frac{cN}{N - \underline{k}}\left(N - \delta N - \theta_v \alpha(\delta N - \underline{k})\right) + \theta_v \frac{2(N - \delta N)Nw}{N - \underline{k}}.
$$

At $\delta = 1$,

$$
\frac{\partial G_{NB}}{\partial \delta} < 0,
$$

and at $\delta = \underline{k}/N$,

$$
\frac{\partial G_{NB}}{\partial \delta} > 0,
$$

and the second derivative is,

$$-\frac{cN}{N-\underline{k}}(N+\theta_v \alpha N)-\theta_v\frac{2N^2w}{N-\underline{k}}<0.$$

Thus, the first order condition yields the optimal δ

$$\delta_s^{NB}=\frac{cN+\theta_v(\alpha\underline{k}+2Nw)}{cN+\theta_v(\alpha N+2Nw)}<1.$$

If condition (1) is violated, then up to $\tilde{\delta}$ welfare is given by G_{NB} because bribery is not feasible in this range of discretion. Thus, the local maxima given $\delta<\tilde{\delta}$ is,

$$min\{\frac{\underline{k}}{N-\lambda},\delta_s^{NB}\}.$$

or,

$$min\{\tilde{\delta},\delta_s^{NB}\}.$$

Define,

$$\tilde{\delta}_1\equiv\frac{N(c+2\theta_v w)}{c(N+\alpha\lambda\theta_v)+2N\theta_v w}.$$

Note that $\tilde{\delta}_1<1$. Upon some calculations, it can be shown that this local maxima, denoted by δ'_{NB} is,

$$=\begin{cases}\tilde{\delta}\text{ if }\tilde{\delta}\leq\tilde{\delta}_1\\ \delta_s^{NB}\text{ if }\tilde{\delta}>\tilde{\delta}_1\end{cases}$$

We now study the local maxima for $\delta\geq\tilde{\delta}$. Above $\tilde{\delta}$, bribery is feasible for firms in the interval $[\underline{k},\delta(N-\lambda)]$ so that (9) can be written as,

$$\begin{aligned}G_B=g\left(\frac{(N-\delta(N-\lambda))^2}{(N-\underline{k})^2}\right)-c\frac{(N-\delta N)^2}{N-\underline{k}}\\ -c\left(\frac{2N-2\delta N+\delta\lambda}{2}\right)\frac{\delta\lambda}{N-\underline{k}}\\ -\theta_v\left(\frac{\alpha c(\delta\lambda)^2}{2(N-\underline{k})}+\frac{w(N-\delta N)^2}{N-\underline{k}}\right)+\theta_v w\frac{(N-\delta(N-\lambda))^2}{2(N-\underline{k})}.\end{aligned}\qquad(13)$$

After some algebra, it can be shown that,

$$\frac{\partial G_B}{\partial \delta}|_{\delta=1} < 0$$

if and only if,

$$g \geq \frac{c - \theta_v w - (\theta_v c \alpha \lambda)}{(N - \lambda)} \equiv g_1. \tag{14}$$

Similarly,

$$\frac{\partial G_B}{\partial \delta}|_{\delta=\tilde{\delta}} < 0$$

if and only if,

$$g > \frac{N^2(N-\underline{k})(2c+\theta_v w) + \lambda^2((N-\underline{k})(c-\theta_v w) + \alpha c \underline{k} \theta_v) - \lambda N(-2c\underline{k} + 3cN + 2\underline{k}\theta_v w)}{(N-\underline{k})(N-\lambda)^2} \equiv g_2, \tag{15}$$

Finally, we study the second order condition. Again, with a few steps of algebra it follows that,

$$\frac{\partial G_B^2}{\partial \delta^2} > 0$$

if and only if

$$g \geq \frac{N^2(2c+\theta_v w) - 2\lambda N(c-\theta_v w) + \lambda^2(\alpha c \theta_v + c - \theta_v w)}{(N-\lambda)^2} \equiv g_3. \tag{16}$$

Next, we prove the following claim that $g_3 > g_2 > g_1$. Specifically,

$$g_2 - g_1 = \frac{N(N-\lambda-\underline{k})(c(N+\alpha\lambda\theta_v) + 2N\theta_v w)}{(N-\underline{k})(N-\lambda)^2} > 0,$$

because condition (1) is violated. Similarly,

$$g_3 - g_2 = \frac{\lambda N(c(N+\alpha\lambda\theta_v) + 2N\theta_v w)}{(N-\underline{k})(N-\lambda)^2} > 0.$$

Finally,

$$g_3 - g_1 = \frac{N(c(N+\alpha\lambda\theta_v) + 2N\theta_v w)}{(N-\lambda)^2} > 0.$$

Hence, $g_3 > g_2 > g_1$.

Next, we identify the local maxima - that is, the value of δ that maximizes G_B subject to the constraint that $\delta \geq \tilde{\delta}$

If $g > g_2$ the G_B is decreasing everywhere in $(\tilde{\delta}, 1)$ - specifically, it is either strictly concave and decreasing or strictly convex and decreasing in this interval. Hence, $\tilde{\delta}$ is the local maxima for any $\delta \geq \tilde{\delta}$. Instead, if $g \in (g_1, g_2]$, then the local maxima is in the range $\tilde{\delta}$. Finally, if $g \leq g_1$, then the local maxima is at $\delta = 1$.

Finally, note that at $\tilde{\delta}$ $G_B = G_{NB}$.

We now combine these insights to prove each claim in this proposition.

1. If condition 1 is satisfied, then the maximizer of G_{NB} is the global maximand.

   Claims 2 (a) - (c) all assume that and $\tilde{\delta} \leq \tilde{\delta}_1$. Under this condition:

2 a. If $g > g_2$ then G_{NB} is increasing up to $\tilde{\delta}$ and decreasing beyond it. Thus, $\tilde{\delta}$ is the global maxima.

2 b. If $g_1 < g \leq g_2$, then G_{NB} is increasing up to $\tilde{\delta}$, but G_B is strictly concave for all $\delta > \tilde{\delta}$ and increasing at $\tilde{\delta}$. Thus, the global maximia is $\in (\tilde{\delta}, 1)$.

2 c. If $g < g_1$, then G_{NB} is increasing up to $\tilde{\delta}$, but G_B is strictly concave and increasing for all $\delta > \tilde{\delta}$. Hence, the global maxima is at $\delta = 1$.

If $\tilde{\delta} > \tilde{\delta}_1$ and $g > g_2$, then G_{NB} is maximized at δ_s^{NB}, but G_B is decreasing for all $\delta > \tilde{\delta}$. Hence, δ_s^{NB} is the global maximand. Finally, $\tilde{\delta} > \tilde{\delta}_1$ and $g > g_2$, but $g < g_1$, then the socially maximizing level of discretion may be above or below δ_s.

■

7.7 Proof of Proposition 3

Proof. If condition (1) is satisfied, then the result follows directly. If condition (1) is violated then the outcome depends on g. If $g \geq g_2$, then the optimal level of discretion is either $\tilde{\delta}$ or δ_S^{NB}. In either case bribery is not allowed but is tempting so officials must incur temptation costs. If $g < g_2$, the unless $\tilde{\delta} > \tilde{\delta}_1$, then bribery is permitted because $\delta_s > \tilde{\delta}$.

Comparative statics for all except N are straightforward in the case where condition 1 is satisfied except for:

$$\frac{\partial \delta_s}{\partial N} = -\frac{\underline{k}\theta_v \alpha}{N^2(c+\theta_v(2w+\alpha))}$$

■

7.8 Proof of Welfare Proposition 4

Proof. When (1) is satisfied, then the official chooses δ to maximize,

$$\pi_{NB} \equiv (1+\theta_v)w(N-E(k)) - \theta_v\left(\frac{\alpha c(\delta N-\underline{k})^2}{2(N-\underline{k})} + \frac{w(N-\delta N)^2}{N-\underline{k}}\right).$$

The first order condition simplifies to,

$$-\frac{\theta_v}{N-\underline{k}}\left(\alpha c(\delta N-\underline{k}) - 2Nw(N-\delta N)\right)$$

And, the second order condition is,

$$-\frac{\theta_v}{N-\underline{k}}\left(\alpha c N + 2wN^2\right) < 0.$$

Further, at $\delta = 1$, the first order condition is,

$$-\frac{\theta_v}{N-\underline{k}}\alpha c(N-\underline{k}) < 0,$$

and at $\delta = \frac{k}{N}$, the first order condition is,

$$-\frac{\theta_v}{N-\underline{k}}\left(\alpha c(0) - 2Nw(N-\underline{k})\right) > 0.$$

Thus, an interior solution exists which is,

$$\frac{\alpha c\underline{k} + 2wN}{\alpha c N + 2wN} \equiv \delta_o$$

To show that $\delta_o < \delta_s$ a few steps of algebra shows that,

$$\frac{\partial G_{NB} - \pi_{NB}}{\partial \delta} = \frac{cN^2(1-\delta)}{N-\underline{k}} > 0.$$

Since the derivative is always positive, it follows that $\delta_s > \delta_o$.

When condition (1) is violated, then the official chooses δ to maximize,

$$\pi_B \equiv \alpha c \left(\frac{\delta(N+\lambda) - \underline{k})(\delta(N-\lambda) - \underline{k})}{2(N-\underline{k})} \right) - s\delta \left(\frac{\delta(N-\lambda) - \underline{k}}{N-\underline{k}} \right) + (1+\theta_v) w \frac{(N - \delta(N-\lambda))^2}{2(N-\underline{k})} - \theta_v \left(\frac{\alpha c \delta \lambda^2}{2(N-\underline{k})} + \frac{w(N-\delta N)^2}{N-\underline{k}} \right). \quad (17)$$

■