



## Endemic corruption

Nava Kahana<sup>a,b</sup>, Liu Qijun<sup>c,\*</sup>

<sup>a</sup> Department of Economics, Bar-Ilan University, 52900 Ramat-Gan, Israel

<sup>b</sup> IZA, Bonn, Germany

<sup>c</sup> School of Public Administration, Huazhong University of Science and Technology, Wuhan, China

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### ABSTRACT

We draw on the background of regional and local governments in China to identify the source of endemic corruption in the behavior of officials in government bureaucracies. When personal advancement in a bureaucracy involves payment of bribes to superiors, corruption is the consequence of the need to finance the bribes. In order to pay the bribes, government officials need to receive bribes, which are sought from subordinates in the government bureaucracy and from private individuals. All individuals are not, of course, equally corrupt or corruptible and merit is also a basis for advancement. However, corruption is endemic if the heads of government bureaucracies are corrupt in the procedures and criteria for personal advancement in the government bureaucracy.

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## 1. Introduction

In many societies, corruption is endemic or ubiquitous. Bribes are not an aberrant random occurrence but are anticipated when contact with government officials takes place. It is understood that bribes are required when applying for a driver's license, registering a car, receiving a car back after impoundment by the police, proceeding on with a trip when stopped by the police, avoiding being charged with tax evasion, receiving imports or shipping exports, and admitting a son or daughter into a quality school or into a chosen college or university. Bribes may be an accompaniment of rezoning of land from agriculture to commercial or residential development. Bribes may be required to obtain government-regulated directed credits. Different languages have their own terms for the necessity of paying bribes.<sup>1</sup>

In this paper we locate the source of endemic corruption in the need to finance personal advancement in the government bureaucracy. We depart from previous perspectives on corruption in two ways.

First, we do not focus on the interface between the government bureaucracy and private individuals. The interface is present but the origins of corruption are within the bureaucracy where higher-level government officials extract rents from lower-level officials.

\* Corresponding author. Tel.: +86 27 87557333; fax: +86 27 87558141.

E-mail address: [liuqijunlj@tom.com](mailto:liuqijunlj@tom.com) (L. Qijun).

<sup>1</sup> On the endemic corruption in many countries, see [Tanzi \(1998\)](#), [Easterly \(2001\)](#), [Seldadyo \(2008\)](#). On endemic corruption in Russia, see [Levin and Satarov \(2000\)](#); and on India see [Pani and Mohanty \(2007\)](#). Corruption is also endemic within regions: [Becker, Egger, and Seidel \(2009\)](#) provide empirical evidence indicating contagion of corruption among neighboring countries. The extent of corruption is revealed in the measures of perceptions of corruption in the Transparency International Index and in other indicators such as the International Country Risk Guide (ICRG), and Business International (BI).

The bribes sought through the interface between the bureaucracy and the private sector are required for bureaucrats to pay their own bribes to superiors in the bureaucratic hierarchy, in order to achieve professional advancement. Bribes thus pass up the hierarchy.<sup>2</sup>

Second, we also depart from existing perspectives on corruption by not casting relationships in terms of a principal–agent problem. There is no principal who seeks to ensure that subordinates are not corrupt. The principal rather benefits from the corruption of his or her subordinates through the bribes received.<sup>3</sup>

In the model that we set out, reflecting as close as possible the reality, bribes paid within the bureaucratic hierarchy advance an individual's promotion prospects but promotion prospects also depend on personal ability. Nor are all government bureaucrats equally corrupt or corruptible. We shall describe government officials as differing in aversion to accepting and giving bribes.

Our basic contribution relates to causes of corruption. Endemic corruption emanates from attributes of the bureaucrat at the top of the government hierarchy. Personal abilities and the disutility of accepting bribes of the top official determine the subordinates' behavior in the bureaucracy. The top official's ethics permeate the government bureaucracy and reach out to the interface between the government bureaucracy and private individuals. Whether behavior is ethical at the top thus determines whether corruption is endemic.

## 2. Institutions

We describe institutions that include an organized functioning government bureaucracy. There is government control, with bureaucracies accountable in principle to the government. Such conditions contrast with circumstances where anarchical dysfunctional government bureaucracies serve no purpose other than to extract rents from the private sector.<sup>4</sup> In the latter cases, government officials are in general paid very little in official salaries and use their positions to independently seek bribes for themselves. The functioning bureaucratic hierarchy that we describe provides personal benefits from promotion within the official hierarchy. Bribes are sought to facilitate promotion rather than for direct personal benefit.

Institutions reflect culture and accommodate to circumstances. For example, in China, the legal limit to permissible bribes is specified in Articles 383 and 385 of the Chinese Criminal Law as 5000 RMB *yuan* (some US\$700) per transaction. Government officials taking a bribe above this limit are liable for prosecution, although unreported bribes in excess of the legal limit are common.

Bribes are often paid in kind, through “presents”. Stores specialize in high-cost gifts that, it is understood, can be returned and exchanged for cash by the beneficiaries of the gifts. The high-cost gifts thereby become fungible without money directly changing hands between the person giving the bribe and the recipient of the bribe. High level officials who have less need for money to pay bribes for further promotion may be more receptive to bribes in kind, such as the use of automobiles belonging to private-sector firms, paid vacations, or the financing of the official's children or other family members studying abroad. We shall take the form of a bribe as secondary to the value of the bribe.

Studies of the consequences of corruption in general suggest that corruption is disadvantageous for growth.<sup>5</sup> Corruption is also socially unjust because of the disproportionate benefits from corruption to those people with the personal resources to give bribes. For China, corruption has been viewed as beneficial to growth and as creating equality by facilitating rent sharing between the private sector and government officials. The rent sharing gives government officials a stake in economic success in the private sector that is similar to the interests of governments in expanded tax bases.<sup>6</sup>

We do not address here the question of whether corruption has indeed been beneficial in China. Our question concerns the reason for endemic corruption — or why an encounter with a government official has in general involved the anticipation of the need for a bribe.

## 3. The model

We describe a three-tier bureaucratic hierarchy, as illustrated in Fig. 1. However, conclusions generalize to  $n$  hierarchical levels. The beginning is a vacancy at the position  $L_{21}$  at the second hierarchical level. We assume that only two bureaucrats at the lowest hierarchical level compete for the vacant position. The superior at the highest level chooses between the two contenders for promotion. We allow for the possibility that there are non-corruptible bureaucrats: we do not wish to suggest that every government official is of necessity corrupt or corruptible. We first assume that the head of the bureaucracy is not corruptible and selects a bureaucrat for promotion on merit alone.

If the bureaucrat  $L_{32}$  is promoted to the position  $L_{21}$ , this leaves a vacancy in the position  $L_{32}$ . The former incumbent in this position has become a superior, who passes judgment on who will be the replacement in his former position  $L_{32}$ . There are  $n$

<sup>2</sup> Bribes passing up a bureaucratic hierarchy were described by Hillman and Katz (1987). They were concerned with the extent of rent dissipation when positions in the hierarchy to which rents accrue are contestable, and time and resources are therefore used in rent seeking, with the bribe having become a rent to be sought. We shall be concerned with rent extraction but our focus is not on the social cost of rent seeking.

<sup>3</sup> Therefore, principals are not principled (see Besley, 2006; Liu, 2007).

<sup>4</sup> On institutions and bureaucracy, and also rent extraction, see Hillman (2009, chapter 2).

<sup>5</sup> See for example, Abed and Gupta (2002).

<sup>6</sup> On incentives due to rent sharing in China, see for example Li, Li, and Zang (2000). They attribute rent sharing to interregional governmental competition that required cost reductions. Still, the bribes are unofficial taxes with associated excess burdens and disincentives. On corruption and fiscal federalism in China, see Chen (2004). He (2000) provided a picture of corruption in China. Although the motivation for the model in this paper comes from Chinese bureaucracy, we do not wish to suggest that corruption and rent seeking are not present in other societies. While, as noted, corruption is endemic in many low-income countries, Alt and Lassen (2003) observe the presence of corruption in the U.S. and Angelopoulos, Philippopoulos, and Vassilatos (2009) report high social costs of rent seeking through the government budget in the European Union.

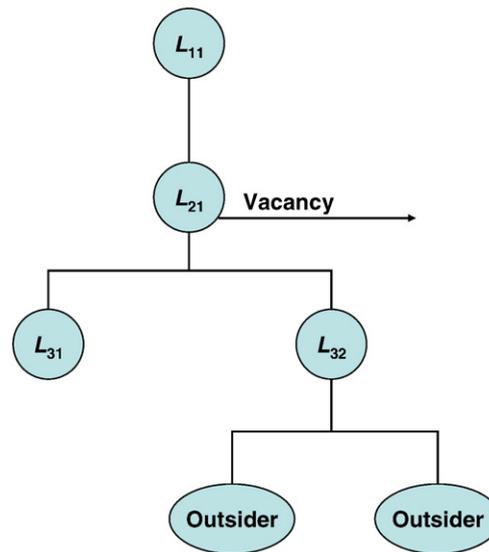


Fig. 1. The hierarchical structure.

outsiders contending for the induced vacant position in the hierarchy.<sup>7</sup> The successful candidate will benefit from an increased wage:  $R_3 = w_3 - w_R > 0$ , where  $w_3$  is the salary in the positions at level 3 in the bureaucracy and  $w_R$  is the reservation wage paid to outsiders.<sup>8</sup>

We allow a role for objective merit in determining who obtains the vacant position. Each contender  $j$  has a history that confirms objective personal average performance  $a_j$ . The money value of an average performance is a function of one's personal ability measured in performance terms,  $a_{0j}$ , and work effort. An average performance above  $a_{0j}$  is denoted by  $d_j$  and requires personal costs consisting of the cost of effort.<sup>9</sup> The cost of effort is negatively related to ability and is equal to  $\alpha_j C(d_j)$ , where  $\alpha_j = \alpha(a_{0j})$  and  $\alpha'(a_{0j}) < 0$ . Lower cost of effort is required from bureaucrats with higher ability in order to increase performance, with  $C(0) = 0$ ,  $C'(0) = 0$ ,  $C' > 0$  for positive arguments, and  $C'' > 0$ .<sup>10</sup>

A candidate can bribe the promoted bureaucrat  $L_{32}$  to increase the probability of being selected for replacement in the vacant position. The bribe paid by candidate  $j$  is  $x_j$ .

Paying a bribe incurs two kinds of costs: a pecuniary cost equal to  $x_j$  and a quasi-fixed non-pecuniary or emotional cost  $b_j$  from involvement in bribery that is independent of  $x_j$ . A higher  $b_j$  indicates greater aversion to being involved in corruption.

We describe a Tullock contest (Tullock, 1980).<sup>11</sup> The probability that person  $j$  is promoted within the bureaucratic hierarchy to a position at level  $k$  is:

$$P_j = \frac{z_j}{\sum_{i=1}^n z_i}, \quad (1)$$

where  $z_i = (1 - \beta_k)x_i + \beta_k a_i$ ,  $x_i \geq 0 \forall i$  is the weighted average of bribe and average performance;  $0 \leq \beta_k < 1$  is the weight assigned to average performance, and  $n$  is the number of contenders competing for the position.

<sup>7</sup> Underlying our model, applications for public positions have been growing dramatically in China, from 87,000 in 2003 to 1,050,000 in 2008. Due to the relatively higher and stable wages, public sector jobs have become the most attractive in all sectors. The 1,050,000 applicants in 2008 competed for the 13,566 posts offered in the central government agencies in 2009. There were therefore some 78 applicants for each post on average, and the most competitive record being 4723 to 1. See <http://edu.qq.com/zt/2008/2009gwy/>.

<sup>8</sup> We assume here that the salary in the positions at the lowest level is higher than the reservation wage paid to outsiders, as is often the case in rent-seeking societies. The official salaries may not be higher in all countries than the wage offered in other sectors for jobs of the same level, but the actual incomes that incumbent officials can obtain, combining legal and illegal incomes, are often higher. In a rent seeking society, it is often the potential rents in public positions that attract rent seekers to compete for public office (Buchanan, 1980, pp.12–14; Tanzi, 1998). This is especially true in countries where public positions are preferred to other occupations (see footnote 5). The correlation between the wage level in the public sector and corruption in an economy is controversial (Seldadyo, 2008) and is not our concern here. For empirical research on the effects of public sector wages on corruption, Rauch and Evans (2000), Rijkkeghem and Weder (2001), Alt and Lassen (2003), Herzfeld and Weiss (2003), and Gurgur and Shah (2005). We should also note that insofar as there is bureaucratic incumbency, the rents obtained through public-sector wages endure over time and in principle need to be calculated as such (see Aidt and Hillman, 2008). Rather than explicitly positing present-value terms, we use the terminology of a static model.

<sup>9</sup>  $d_j = a_j - a_{0j}$ , where  $a_j$  is the objective personal average performance and  $a_{0j}$  is the personal ability measured in performance terms.

<sup>10</sup> An example of a function that satisfies these conditions is:  $C(d_j) = \alpha_{0j}^{-1} d_j^2$ .

<sup>11</sup> A rationale for a Tullock contest hinges on the assumption that the bureaucrat's objective function is a weighted average of expected social welfare (interpreted in our content as performance) and lobbying outlays (interpreted as bribes). If the bureaucrat assigns a sufficiently high weight to lobbying outlays, then it is rational for the bureaucrat to create a Tullock contest and make his decisions randomly. For a detailed discussion of contest rationalization-micro foundations, see Epstein and Nitzan (2006).

It is assumed here that bribes and objective performance are perfect substitutes for the promoted bureaucrat who makes the decision about his or her replacement. As  $\beta_k$  increases, the weight assigned to performance in the promotion decision increases and the role of bribery declines. We assume that the candidates are risk neutral and choose the bribe  $x_j$  and work effort  $d_j$  to maximize their expected utilities:

$$EU_j = P_j R_k - x_j - \alpha_j C(d_j) - b_j, \tag{2}$$

where  $R_k$  is the net increase in wage in consequence of being promoted to a position on level  $k$  (here  $k=3$ ). An interior Nash equilibrium therefore requires:

$$\frac{\partial EU_j}{\partial x_j} = \frac{(1-\beta_3) \sum_{i \neq j}^n z_i}{\left[ \sum_{i=1}^n z_i \right]^2} R_3 - 1 = 0, \tag{3}$$

and

$$\frac{\partial EU_j}{\partial d_j} = \frac{\beta_3 \sum_{i \neq j}^n z_i}{\left[ \sum_{i=1}^n z_i \right]^2} R_3 - \alpha_j C' = 0. \tag{4}$$

From Eqs. (3) and (4), it follows that:

$$C' = \frac{\beta_3}{\alpha_j(1-\beta_3)} \forall j. \tag{5}$$

Let  $d_j^*$  be the solution to Eq. (5). Since  $C(d_j)$  is convex and  $\alpha_j$  decreases with ability, it follows from Eq. (5) that  $d_j^*$  increases with ability,  $a_{0j}$ . Notice that  $\beta_3=0$  implies that  $C'=0 \forall j$  and thus,  $d_j^*=0$ , in which case no work effort is exerted.

Through symmetry, it follows from Eq. (3) that:

$$z_j^* = z = \frac{(1-\beta_3)(n-1)}{n^2} R_3, \forall j, \tag{6}$$

or

$$x_j^* = \frac{n-1}{n^2} R_3 - \frac{\beta_3}{1-\beta_3} a_j^*. \tag{7}$$

Let  $\hat{a}^*$  be performance such that  $\hat{a}^* = \frac{(1-\beta_3)(n-1)}{\beta_3 n^2} R_3$ . We denote the corresponding ability by  $\hat{a}_0$ . From Eq. (7), it follows that a necessary condition for a contender for the vacant position paying a bribe (i.e., for  $x_j^* > 0$ ) is having an ability less than  $\hat{a}_0$ . Hence, with  $n$  competing candidates for promotion, only the  $m$  candidates with ability lower than the threshold ability  $\hat{a}_0$  pay a bribe. The sum of bribes that official  $L_{32}$  obtains is:<sup>12</sup>

$$\sum_{j=1}^m x_j^* = \frac{m(n-1)}{n^2} R_3 - \frac{\beta_3}{1-\beta_3} \sum_{j=1}^m a_j^*. \tag{8}$$

If  $\beta_3 > 0$ , then  $\lim_{n \rightarrow \infty} \hat{a}^* = 0$ . If  $0 < \beta_3 < 1$  and  $m \rightarrow n \rightarrow \infty$ , then  $\sum_{j=1}^m x_j^* \rightarrow R_3$ . If the superior assigns a weight  $\beta_3 = 1$  to performance, no bribe is paid.

We can summarize regarding corruption and ability.

**Proposition 1.** (1) If ability and bribes are perfect substitutes in promotion decisions, other things being equal, higher ability people pay lower bribe if any. Only individuals with ability less than  $\hat{a}_0$  pay a bribe, where  $\hat{a}_0$  is increasing in the wage difference, decreasing in the weight assigned to performance and the number of contenders, and converges to zero as that number tends to infinity.

(2) As the number of contenders tends to infinity and their ability approaches zero, the total payment of bribes equals the total benefits from promotion,<sup>13</sup> whereas if contenders are of ability higher than  $\hat{a}_0$  no bribe is paid and promotion is determined according to merit.

<sup>12</sup> The  $n-m$  contenders with ability not lower than the threshold ability level  $\hat{a}_0$  do not pay a bribe and their optimal average performance is  $a_j^* = \frac{z_j^*}{\beta_3} = \frac{(1-\beta_3)(n-1)}{\beta_3 n^2} R_3 = \hat{a}^*$ .

<sup>13</sup> This would translate into complete rent dissipation if resources equal to the values of bribes were attracted into rent seeking. On rent seeking in bureaucratic hierarchies, see Hillman and Katz (1987).

By substituting Eq. (7) into Eq. (2), we obtain that the expected utility of each of the  $m$  contenders who pay a bribe is:<sup>14</sup>

$$EU_j = \frac{R_3}{n^2} + A_j - b_j, \quad (9)$$

where

$$A_j = \frac{\beta_3}{1-\beta_3} a_j^* - \alpha_j C(d_j^*) > 0. \quad (15)$$

A necessary and sufficient condition for contender  $j$  among the  $m$  potential low-ability contenders to pay a bribe is that  $EU_j \geq 0$ , which implies:

$$b_j \leq \frac{R_3}{n^2} + A_j = \hat{b}_j. \quad (10)$$

A contender  $j$  will therefore pay a bribe only if he or she is less averse to corruption than  $\hat{b}_j$ .

From revealed preference, it follows that  $A_j$  and consequently  $\hat{b}_j$  increase with ability. Therefore, contenders with higher abilities will pay bribes even if they are more averse to corruption, as long as their ability does not exceed  $\hat{a}_0$ . As  $n$  increases,  $\hat{b}_j$  decreases, and thus only the more corrupt contenders will pay bribes.

We can consider for illustration a case where the combination of ability and degree of corruption of the outsiders is such that only two contenders  $j = 1, 2$  pay a bribe.

For these contenders:

$$a_{01} < \hat{a}_0, b_1 \leq \frac{R_3}{n^2} + A_1 = \hat{b}_1, \quad (11a)$$

and

$$a_{02} < \hat{a}_0, b_2 \leq \frac{R_3}{n^2} + A_2 = \hat{b}_2. \quad (11b)$$

The total bribe that official  $L_{32}$  obtains is:

$$\frac{2(n-1)}{n^2} R_3 - \frac{\beta_3}{1-\beta_3} (a_1^* + a_2^*). \quad (12)$$

In order to be willing to accept this amount of bribe, official  $L_{32}$  is required to be no more averse to corruption than:

$$\hat{b}_{32} = \frac{2(n-1)}{n^2} R_3 - \frac{\beta_3}{1-\beta_3} (a_1^* + a_2^*). \quad (13)$$

If disutility from receiving the bribe is higher than  $\hat{b}_{32}$ , the bribe will be refused and promotion to position  $L_{32}$  will also be decided only according to ability.

Thus, if the head of the bureaucracy is benevolent (i.e.  $\beta_1 = 1$ ) or fully incorruptible (in terms of  $b$ ), the promoted official ( $L_{31}$  or  $L_{32}$ ) deciding on the replacement bureaucrat will also refuse to accept bribes if his/her disutility from involvement in corruption is not lower than  $\hat{b}$ . That is:

$$b_{31} = b_{32} \geq \hat{b} = \hat{b}_{32} + \delta = \frac{2(n-1)}{n^2} R_3 - \frac{\beta_3}{1-\beta_3} (a_1^* + a_2^*) + \delta, \quad (14)$$

where  $\delta > 0$ .

**Proposition 2.** (1) If ability and bribes are perfect substitutes in promotion decisions, other things being equal, only contenders with ability less than  $\hat{a}_0$  and averse to corruption lower than  $\hat{b}_j$  pay a bribe, where  $\hat{b}_j$  (as defined in Eq. (10)) is decreasing in the number of contenders, increasing in the wage difference, and in the weight assigned to performance and the ability.

(2) The bribe will be refused if the head of the bureaucracy is benevolent (i.e.  $\beta_1 = 1$ ) or fully incorruptible (with a very high  $b$ ) and the superior official (the one deciding on the replacement bureaucrat) is not less averse to corruption than  $\hat{b}$ , where  $\hat{b}$  (as defined in Eq. (14)) is increasing in the wage difference, decreasing in the number of contenders, and in the weight assigned to performance and the ability of the contenders.

From Proposition 2 it follows that less corruptible contenders will pay a bribe only if they have a sufficiently high ability but not higher than the threshold ability  $\hat{a}_0$ . The more contenders there are, the less likely it is that bribery will occur, unless the contenders as well as the superior official are sufficiently corrupt.

<sup>14</sup> For simplicity, we ignore the possibility of detection and punishment. This assumption is reasonable only if the number of candidates is not too large.

<sup>15</sup> From Eq. (5), it follows that  $A_j = \alpha_j (a_j^* C - C)$ . Since  $C(0) = 0$  and  $C' > 0$ , one gets that  $A_j > 0$ .

The official at the highest hierarchical level  $L_{11}$  may however view bribes and merit as perfect substitutes and assign a weight  $\beta_1 < 1$  to average performance.<sup>16</sup> If his/her disutility from accepting bribes is sufficiently low, the officials  $L_{31}$  and  $L_{32}$  may need to pay bribe while competing for promotion to position  $L_{21}$  and thus will be involved in a two-stage game. Each official knows how the promotion decision will be influenced by bribes. The rent  $R$  from position  $L_{21}$  which includes the bribes received (stage 2 of the game) and the wage difference (stage 1) is:

$$\begin{aligned}
 R &= \frac{2(n-1)}{n^2}R_3 - \frac{\beta_3}{1-\beta_3} \sum_{j=1}^2 a_j^* + w_2 - w_3 \\
 &= \frac{2(n-1)}{n^2}R_3 - \frac{\beta_3}{1-\beta_3} \sum_{j=1}^2 a_j^* + R_2 > R_2.
 \end{aligned}
 \tag{15}$$

Given that the abilities of officials  $L_{31}$  and  $L_{32}$  are below the threshold ability level, from Eqs. (9) and (15), it follows that the expected utility of the officials competing for position  $L_{21}$  is:

$$EU_{ks} = 0.25 \left( \frac{2(n-1)}{n^2}R_3 - \frac{\beta_3}{1-\beta_3} \sum_{j=1}^2 a_j^* + R_2 \right) + A_{ks} - b_{ks}, \quad ks = 31, 32,
 \tag{16}$$

where  $A_{ks} = \frac{\beta_1}{1-\beta_1} a_{ks}^* - \alpha_{ks} C(a_{ks}^* - a_{0ks})$ .<sup>17</sup>

By substituting  $b_{31} = b_{32} = \hat{b}$  in Eq. (16), we find that a necessary and sufficient condition for non-negative expected utility of the officials competing for position  $L_{21}$  is:

$$R_2 \geq \frac{6(n-1)}{n^2}R_3 + 4\delta - \frac{3\beta_3}{1-\beta_3} - 4A_i \quad i = 31, 32.
 \tag{17}$$

Let us assume that  $b_{31} = b_{32} = \hat{b}$  (see Eq. (14)). From Eq. (17), it follows that if (i)  $\beta_1 < 1$  and the head of the bureaucracy  $L_{11}$  is sufficiently corrupt, (ii)  $R_2$  is sufficiently great to satisfy inequality Eq. (17), then the promoted official accepts bribes and pays a bribe to the superior official. However, as shown before, if the head of the bureaucracy is benevolent or incorruptible, the promoted official with  $b_{32} = \hat{b}$  will also refuse to accept bribes.

Our concluding proposition expresses the significance of corruption at the top of the corruption in the hierarchy.

**Proposition 3.** If the wage difference between the bureaucratic hierarchical levels,  $R_2$ , is sufficiently great, there is a threshold degree of aversion to corruption of the officials in the second hierarchical level,  $\hat{b}$ , such that, if the head of the bureaucracy is benevolent or not corruptible, then all others in the bureaucracy will not be corruptible. Conversely, if the head of the bureaucracy is corruptible enough, all others in the bureaucratic hierarchy will be corruptible.<sup>18</sup> That is, whether or not there is endemic corruption depends on (among other things) who is at the top of the government bureaucratic hierarchy.

#### 4. Conclusion

Niskanen (1971) observed that self-interested behavior applies to personal objectives in government bureaucracies. Niskanen described bureaucratic behavior within the limits of the law. Bureaucrats seek to maximize utility through rents created by greater government spending that taxpayers would choose and through promotion opportunities provided through more extensive bureaucratic hierarchies than are required for efficient public administration. Niskanen's view of behavior in government bureaucracies contrasts with Max Weber (1947) who described socially aware government bureaucrats who seek only the public interest. Weber took for granted the rule of law and altruism.<sup>19</sup>

The altruistic behavior of dedicated civil servants described by Weber and the limits of personal benefit attributed by Niskanen do not apply when there is endemic corruption, because bribes facilitate bureaucrats' personal advancement. If promotion within the bureaucratic hierarchy could proceed solely on merit, bureaucrats would not confront the compulsion to extract bribes from one another and from the private sector. When bribes paid to superiors influence prospects for personal advancement, subordinates in the bureaucracy face incentives to seek revenue from private-sector bribes to finance their own need for bribes.

The corruption that we have described is thus contrary to descriptions in principal-agent models that take for granted that the source of corruption is the behavior of subordinates and describe principals as necessarily principled.<sup>20</sup> It is indeed the subordinates who may be principled to different degrees but nonetheless by the rules of behavior bribe their superiors to improve prospects for personal advancement.

<sup>16</sup> Aidt (2003) distinguishes between the cases of a benevolent and a non-benevolent principal. The head of the bureaucracy whom we are describing is partly benevolent. See also Besley (2006) and Liu (2007).

<sup>17</sup> From (8) it follows that the sum of bribes that is offered to official  $L_{11}$  is:  $B = x_{31}^* + x_{32}^* = 0.5R_3 - \frac{\beta_1}{1-\beta_1}(a_{31}^* + a_{32}^*)$ . Thus, in order to be willing to accept this amount of bribe his/her disutility from corruption should be not more than  $B$ .

<sup>18</sup> Evidence from Rijkceghem and Weder (2001) suggests that higher (relative) wages reduce corruption in the public sector. We refer not to the absolute wage but to the wage difference between the bureaucratic hierarchical levels.

<sup>19</sup> For a review of the theory of self-interested bureaucracy and comparison between Niskanen and Weber, see Hillman (2009, chapter 2).

<sup>20</sup> See for example Bac (1996), Bag (1997), Dabla-Norris (2002), and the overview by Aidt (2003).

As our model has emphasized, even when corruption is endemic, not all government officials are equally corrupt or corruptible. With the top officials in the bureaucracy instrumental in determining whether corruption is endemic, ending endemic corruption requires ensuring that people with a high personal aversion to corruption choose to become government bureaucrats. Social capital also matters: we would expect increases in social capital to reduce rent extraction.<sup>21</sup>

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<sup>21</sup> Ahlerup, Olsson, and Yanagizawa (2009) confirm the importance of social capital when institutions are ineffective.