Leadership selection, internal promotion, and bureaucratic corruption in less developed polities

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Abstract. The establishment of a professional government bureaucracy in place of political appointees is an important component of an enabling environment for private enterprise. I show that internal promotion can help to bring to power individuals who highly value (relative to income) imposition of their preferences over collective goods on the public. Such individuals restrain the corruption of their subordinates as a byproduct of their efforts to implement their preferences using tax revenue. As a result, large-scale and petty corruption tend to move together and both tend to be lower the longer the practice of internal promotion has been in place. JEL Classification: D73

Sélection des leaders, promotion interne, et corruption bureaucratique dans les pays en voie de développement. La mise en place d'une bureaucratie gouvernementale professionnelle pour remplacer les nominations politiques constitue un élément important pour créer un environnement porteur pour l'entreprise privée. On montre que la promotion interne peut aider à porter au pouvoir des personnes qui valorisent beaucoup la possibilité d'imposer au public leurs préférences quant aux biens collectifs (par opposition à la simple recherche de revenus personnels accrus). De telles personnes vont limiter la corruption de leurs subordonnés en cherchant à imposer leurs préférences dans l'usage des rentrées fiscales. En conséquence, la grande et la petite corruption tendent à être co-reliées, et toutes deux tendent à décroître à proportion que l'on pratique la promotion interne.

1. Introduction

Recent analyses of economic policy-making in less developed countries (LDCs) have stressed that the individuals who make up the state apparatuses can to some

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extent act independently, rather than responding passively to voters or interest groups as in much of the political economy literature. Such a state might be expected to exhibit the 'predatory' behaviour predicted by writers like Lal (1988), as each state functionary seeks to implement regulations on private sector economic activity that will maximize the bribes he can extract. Indeed, we do observe such purely rent-seeking states in LDCs. A good example is the former Zaire, of which President Mobutu stated 'holding any slice of public power constitutes a veritable exchanged instrument, convertible into illicit acquisition of money or other goods' (Young 1978, 172). What is remarkable is that some LDC governments do *not* act as predators. In East Asia, for example, the Korean and Taiwanese states have worked hand in glove with the private sector to promote investment and enhance the capacity of private firms to enter international markets (Amsden 1989; Wade 1990), earning these governments the moniker 'developmental states.'

The use of institutional ratings produced by country risk services for international investors has allowed documentation of variability of the quality of central government bureaucracies and of their effects on economic performance to go beyond case studies to statistical analysis. Knack and Keefer (1995) use ratings by the International Country Risk Guide (ICRG) of 'corruption in government' and 'bureaucratic quality' in one of their indices of institutional quality and use a rating by Business and Environmental Risk Intelligence (BERI) of 'bureaucratic delays' in the other, and Mauro (1995) uses ratings by Business International (BI) of 'bureaucracy and red tape' and 'corruption' in his index of bureaucratic efficiency. Knack and Keefer find positive and significant effects of both of their institutional quality indices on growth in per capita GDP, and Mauro finds the same for his index of bureaucratic efficiency.

While the cross-country statistical evidence reinforces the idea that differential governmental performance may have an impact on economic growth, it tells us little about what kind of institutional characteristics are associated with lower levels of corruption or red tape. If the findings just listed are meaningful, it is worth identifying which characteristics of government bureaucracies lead to good ratings from the ICRG, BERI, and BI on the variables cited above. In his comparative analysis of the role of the state in the development of several LDCs, Evans (1992, 1995) argues that *professionalization* of the state bureaucracy is a necessary (though not sufficient) condition for a state to be 'developmental.' The key institutional characteristics of what he calls 'Weberian' bureaucracy include meritocratic recruitment through genuinely competitive examinations, Civil Service procedures for hiring and firing rather than political appointments and dismissals, and filling higher levels of the hierarchy through internal promotion.

In previous work I studied the potential impact that bureaucratic professionalism could have on the positive role that the state can play in economic development by providing complementary inputs for the private sector.[1] I now wish to turn to the

1 Specifically, in Rauch (1995b) I hypothesized that establishment of a professional bureaucracy in place of political appointees will lengthen the period that public decision makers are willing to wait to realize the benefits of expenditures, leading to allocation of a greater proportion of government

impact of 'Weberianism' on the negative effect the state can have on economic development through corruption or 'predation.' The problem is that we really do not know how the various elements that add up to professional bureaucracy restrain predatory behaviour (assuming they in fact do so) and thus do not know what to expect when not all of these elements are present, as might typically be the case.

In the next section I develop an intuitive argument for why *internal promotion* might tend to generate better performance at both the upper and lower levels of the bureaucratic hierarchy. Before formalizing this argument in section 4 and thereby making clear the conditions under which the key results obtain, I build a model of large-scale and petty bureaucratic corruption in section 3. In the concluding section I discuss some possible extensions of the model.

2. The argument

Bureaucratic corruption is typically addressed using a principal-agent model (see, e.g., Klitgaard 1988), but the standard assumption of such work is that the principal himself is not corrupt, which misses the entire problem of the predatory state. If we are to retain the utility of the principal-agent model without being irrelevant, we must therefore model corruption on the part of the principal. This could mean grafting a model of the entire political process onto a model of bureaucratic corruption. I choose instead to take a simpler approach and abstract from the political process by focusing on one autonomous executive bureaucracy, whose corruption and supply of public goods determine that of the entire government. In doing so I am inspired by the example of Soskice, Bates, and Epstein (1992).[2] I also borrow from this paper the assumption of a hierarchical division of labour within the bureaucracy, where decisions can be made only at the top and implemented only at the bottom, and the assumption that individuals may enjoy leadership for its own sake. In empirical application my modelling strategy amounts to seeing what can be explained by the structure of the bureaucracy, taking the political process as exogenous. One might argue that the political process can negate any incipient effects that bureaucratic structure might generate, but my research cited above offers some hope that this is not always the case.

resources to long-gestation period projects such as infrastructure. I also hypothesized that this increased government investment in inputs complementary to private capital will increase the rate of economic growth. These hypotheses were tested using data generated by a 'natural experiment' in the early part of this century, when a wave of municipal reform transformed the governments of many U.S. cities. Controlling for city and time effects, adoption of Civil Service was found to increase the share of total municipal expenditure allocated to road and sewer investment, while other reforms adopted during this period did not have this effect. This share, in turn, was found to have a positive effect on growth in city manufacturing employment.

2 Another strand of the literature addresses the effects of interagency competition on corruption (Rose-Ackerman 1978; Shleifer and Vishny 1993). In this paper I only examine intraagency bureaucratic structure.

The model of sections 3 and 4, below, contains two key elements. First, individuals are assumed to differ in their desire to exercise effective power, by which I mean their desire to impose their preferences over collective goods on the public.[3] I call the level of this desire power-hunger or ph for short.[4] One can exercise effective power only when one can choose the mix of collective goods the bureaucracy will supply, so one's ph can be satisfied only at the top of the bureaucratic hierarchy. Second, there exist different opportunities for corruption at the different levels of the bureaucracy. At the bottom one can engage in 'petty corruption,' which is defined as stealing tax revenues intended for provision of public goods. An example would be taking kickbacks as a percentage of the value of contracts awarded to collect garbage or build a road. At the top one can engage in 'large-scale corruption,' which is defined as the use of state regulatory powers to create rents. An example would be establishment of a state trading monopoly in which one has a stake directly or through relatives.

To see how these two elements interact I need to specify some more details of the model. The bureaucracy consists of one *chief* and a small number of *deputies*. I make the realistic assumption that the chief needs the deputies to carry out their tasks in order for the bureaucracy to supply goods and services, but that he can pursue corruption on his own (or with the help of relatives and friends). The deputies allocate their time between their assigned tasks and (petty) corruption. The chief allocates his time between monitoring the deputies and (large-scale) corruption. A high-ph chief will closely supervise his deputies to force them to implement his will by using the tax revenue under their control to supply the mix of public goods he has chosen, leaving him little time for corrupt pursuits. A low-ph chief is not interested in imposing his preferences over collective goods and hence spends little time supervising his deputies, instead concentrating on creating and appropriating rents while they rob the public till.

Now suppose we institute a rule of internal promotion (the component of Weberian bureaucracy emphasized by Soskice, Bates, and Epstein 1992), so that the next chief can be chosen only from the current deputies rather than from the entire population. This means that deputies have more than a negligible chance of becoming chief and exercising power. I argue that this will generate an important kind of self-selection among deputies. Any deputy wants to enjoy petty corruption and also wants to be promoted and enjoy large-scale corruption. A high-ph deputy, however, wants to be promoted more because he will also enjoy exercise of effective power. It follows that if there is any effective supervision, a high-ph deputy would respond by reducing his petty corruption more than would a low-ph

3 For simplicity I assume that all individuals in the society are identical in the extent to which they care about income (but see footnote 14 in section 4 below).

4 The parallel concept in Soskice, Bates, and Epstein (1992) is 'ambition.' They do not allow ambition to vary across individuals, however, nor can they clearly distinguish it from the rate at which individuals discount the future. The latter limitation is related to the fact that the government in their model does not do anything with the revenue it collects (other than consume it).

deputy.[5] Since deputies who care about effective power are more likely to become chief, chiefs are more likely to care about effective power. A chief who values exercise of effective power highly will, in turn, spend more time supervising his deputies to ensure that they are carrying out their tasks and less time looking for ways to line his own pockets. Thus, internal promotion is a self-reinforcing system that increases the expected ph of chiefs, tending to increase the extent to which the bureaucracy as a whole carries out its assigned tasks of public goods provision and decrease the extent to which it implicitly taxes the private sector through large-scale corruption. Note that whether or not there is a rule of internal promotion, the model described predicts that the amounts of petty and large-scale corruption will move together.

One could argue to the contrary, of course, that internal promotion simply prevents the best candidates from being appointed to higher positions when they are open. Again, to rely on the government to behave in this manner is to assume away the problem of the predatory state. A government bureaucracy might also want to choose its chief from outside to avoid 'inbreeding' or overly cozy relations with the deputies. I would argue that the main reason to fear inbreeding is that it makes it easier to conceal abuses from an external monitor, but a key feature of my model is precisely the absence of an external monitor. In 'more developed polities' in which checks and balances for decision-makers are more effective, the inbreeding case against internal promotion gains persuasiveness.

Note that I do not claim that the mix of collective goods chosen by a high-ph chief will be more (or less) close to the preferences of the public than the mix chosen by a low-ph chief. While a change from a low-ph chief to a high-ph chief will have a beneficial impact on public welfare by reducing large-scale and petty corruption, it is therefore conceivable that this could be more than offset by preferences over collective goods that differ more from those of the public than the preferences of the low-ph chief.

3. The model without internal promotion

There are three kinds of agents in the model: the public, the deputies, and the chief. There exists a continuum of agents of measure n. As in Soskice, Bates, and Epstein

5 The reader might reasonably ask why the deputies do not use tax revenue to bribe the chief and thus render supervision ineffective. The answer is that the chief's comparative advantage in large-scale corruption leads him to satisfy his desire for income through this channel and satisfy his desire to exercise effective power using tax revenue. Obviously, this answer works only if the chief's ph is sufficiently high. If it is not, the deputies use all tax revenue under their control either for personal consumption or to bribe the chief and government supply of collective goods is zero. (See also the discussion in subsection 3.4.) I would venture to guess, however, that in real-world bureaucracies where this outcome is observed the proximate cause is not low ph but rather the monopolization of opportunities for large-scale corruption and/or exercise of effective power by politicians, making the ph of the top-level bureaucrat irrelevant. Thus, the worst possible outcome in terms of provision of collective goods occurs when bureaucrats are both unsupervised by politicians and powerless.

(1992), I assume an overlapping-generations structure where agents live for two periods. Every agent is endowed with one unit of time in each of the two periods of his life. Agents obtain utility from consumption of a public and a private good, the latter serving as numeraire. It is convenient to assume that this utility is additively separable not only across time but also across goods.

Several parameters, assumed to be constant over time, are set for the bureaucracy by the political process: its total budget T, financed by tax revenues; the number of deputies N, a small integer; and the level of (retirement) compensation per deputy R, discussed when we describe the deputy's problem below. Some deputies are fired and never receive R. I denote the 'survival' rate of deputies in any time period by s_t, which is determined by simply dividing the number of deputies who were not fired in the previous period by N. The bureaucracy purchases q units of the private good to produce each unit of the public good, where q is assumed to be constant over time. There are no capital markets in the model, ensuring that in any period the maximum funds available to the bureaucracy to purchase the private good equal

$$T - s_t NR. \tag{1}$$

The maximum number of units of the public good that the bureaucracy can produce in any period is therefore

$$(T - s_t NR)q. \tag{2}$$

The public good is a differentiated product of which a continuum of types can be produced. An example could be transportation infrastructure, which can be supplied by a mix of roads, rail facilities, airports, and so forth, so that we can think of the various mixes of equal cost as corresponding to the 'types' of public good.

3.1. The public

It is assumed that the public is subjected to two forms of taxation, explicit and implicit, which form the respective bases for two types of corruption, petty and large scale. Explicit taxation means taxation in the usual sense of the word: trade taxes, sales taxes, income taxes, and so on. These are the tax revenues T, defined above. These tax revenues may fall prey to petty corruption: the deputies charged with procuring the private goods necessary to produce the public good may instead procure some of these private goods for themselves. Implicit taxation is assumed to be the sole prerogative of the chief and is equivalent to the large-scale corruption he undertakes. Following Shleifer and Vishny (1993), I assume that implicit taxation (large-scale corruption) is more distortionary than explicit taxation. In order to keep the model simple, I implement this distinction by assuming that explicit taxation is *non*-distortionary (i.e., lump sum), while implicit taxation takes a very simple distortionary form, to be described below.

Denote by z_t^* the percentage of funds given by (1) that escapes the petty corruption of the deputies. From (2), the number of units of the public good actually

supplied by the bureaucracy equals $z_t^*(T - s_t NR)q$. The utility obtained from consumption of the public good at time t by a representative member of the public in the first period of her life is then

$$u_{1t} = u_1(z_t^*(T - s_t NR)/qh(\nu_t)), \tag{3}$$

where ν measures the 'distance' between this agent's ideal type of public good and the type actually supplied, and h is a 'compensation function' that is monotonically increasing and satisfies $h(0) = 1$.[6]

As do Soskice, Bates, and Epstein (1992), I assume that the public can defend itself against the predation of the bureaucracy only by withdrawing its resources from the market. In the language of Hirschman (1970), the public in my model has the option of 'exit' but not that of 'voice.' This is what I mean by 'less developed polities' in the title of this paper.[7] Specifically, I follow Ades and Verdier (1996) in assuming that each member of the public can allocate her unit of time between two activities that produce the private good. The first has decreasing returns to scale, with output given by $f(l_{1t}), f' > 0, f'' < 0, f'(0) = \infty, f'(1) = 0$, where l_{1t} is labour input to activity 1 at time t. The output of this activity cannot be taxed by the chief and can be interpreted as subsistence agriculture or informal sector activity. The second productive activity has constant returns to scale, with output given by al_{2t}. The output from this activity is taxable by the chief and can be interpreted as modern or formal sector output. Since $l_{1t} + l_{2t} = 1$, we can simplify notation by letting $l_{2t} \equiv l_t$ so that $l_{1t} = 1 - l_t$, and further simplify without loss of generality by choosing units so that $a = 1$.

Since there are no capital markets, each member of the public will spend her entire after-tax income in every period on consumption of the private good c_t:

$$c_t = (1 - \tau_t)l_t + f(1 - l_t) - T/n, \tag{4}$$

where τ is the chief's tax rate. The utility obtained from consumption of the private good at time t by a member of the public in the first period of her life is given by $u_2(c_t)$, where $u_2' > 0$, $u_2'' < 0$, and $u_2'(0) = \infty$. Each member of the public chooses l_t and l_{t+1} to maximize her discounted sum of expected utility, given by

$$V^P = u_{1t} + u_2(c_t) + \delta(Eu_{1t+1} + Eu_2(c_{t+1})), \tag{5}$$

where δ is the rate at which the agent discounts the future ($0 < \delta < 1$), E is the expectation operator, and u_{1t} is given by (3).

6 Here I have modelled preferences over the differentiated product exactly as in Helpman (1981).

7 The 'less developed polity' assumption imposes some important limitations on the ability of my model to explain corruption. Since the public has no say in whether or not the decision-maker remains in power, he has no need to 'buy off' the public through patronage jobs, for example, leaving one of the most important forms of corruption unexplained. Avoiding such limitations will require a more comprehensive and ambitious approach than I have taken here.

It is clear that the decision of the representative member of the public is completely time separable and that the first-order condition for a maximum in every time period is given by

$$1 - \tau = f'(1 - l), \tag{6}$$

yielding the implicit function $l^*(\tau)$. Clearly, the value of output is maximized when l is chosen so that $f'(1 - l) = 1$, so any $\tau > 0$ constitutes a distortionary tax.

3.2. The deputies

Each of the N deputies controls an equal share of the available funds (1) and chooses how much of his one unit of time to allocate to procurement of the public good, the remainder being devoted to petty corruption. It is simplest to equate this time allocation decision to the choice of z, the percentage of funds under his control that is actually spent on the public good, in which case $1 - z$ becomes the share of these funds spent on private goods for himself. If a deputy is caught engaging in petty corruption ($z < 1$), he is fired.[8]

I make a number of assumptions that simplify the structure of the representative deputy's problem without affecting the qualitative nature of the results of the model. Each deputy controls funds only in the first period of his life. In the second period of his life, if he was not fired, he receives a fixed retirement compensation (e.g., a pension) R, while if he was fired, he becomes a member of the public. It follows that in the first period of his life the consumption of the private good by the representative deputy equals $(1 - z_t)(T - s_t NR)/N - T/n$, whereas in the second period of his life his consumption of the private good equals $R - T/n$ if he was not fired and is given by (4) if he was fired. R is assumed to be set at a level such that a deputy is worse off if he is fired. The purpose of these assumptions is thus to capture as simply as possible the trade-off a deputy might face when engaging in petty corruption. I also assume that when he is employed by the government a deputy is at his 'bliss point' with regard to consumption of the public good. If we again use the example of transportation infrastructure for the public good, we might interpret this assumption to mean that a deputy has access to a private car and chauffeur supplied by the government for short trips and to a private helicopter or jet for longer trips. Obviously, in the real world this assumption is more accurate for the chief (to whom it will also apply) than for his deputies. The reason I make it for the latter is to avoid complicating the representative deputy's problem by letting his choices of z influence his public as well as his private good consumption.[9] Finally, I assume that a

8 Klitgaard (1988) notes that the penalty for being caught engaging in corrupt activity is typically dismissal; fines and/or prison terms are rare.

9 The assumption that the representative deputy's individual petty corruption is too small to have an impact on the aggregate public good supply is not available because in section 4 I assume there is only one deputy in order to simplify the analysis of internal promotion. I do assume, however, that the effect on s_{t+1} of whether an individual deputy was fired in period t is too small to have an impact on the aggregate public good supply in period $t+1$; in section 4 we will see that the availability of this assumption is not an issue.

deputy's maximized expected utility V^{D*} exceeds that of the public V^{P*} so that every agent would rather be a deputy than a member of the public, and that deputy positions are not rationed on the basis of any characteristic of importance for the behaviour of deputies in the model. This assumption becomes relevant in section 4, when a deputy's chance of being named chief and exercising effective power is no longer negligible, because it ensures that the ph of a deputy is drawn from the same distribution as that of the general population.

I denote by λ the probability with which a deputy is fired. λ is a function not only of z but also of e, the percentage of the one unit of time with which the chief is endowed that he spends supervising his deputies. I assume that the function $\lambda(z,e)$ has the properties $\lambda(z,0) = 0 \ \forall \ z$ and $\lambda(1,e) = 0 \ \forall \ e$. In addition:

i) $\partial\lambda/\partial z < 0 \ \forall \ e > 0$, $\partial^2\lambda/\partial z^2 \geq 0$: A deputy's probability of being fired is decreasing in the share of funds he allocates to his assigned task (increasing in the amount of petty corruption in which he engages), at a rate that is (weakly) diminishing.

ii) $\partial\lambda/\partial e > 0 \ \forall \ z < 1$, $\partial^2\lambda/\partial e^2 \leq 0$: A deputy's probability of being fired is increasing in the amount of time the chief spends supervising him, at a rate that is (weakly) diminishing.

iii) $\partial^2\lambda/\partial z\partial e < 0$: The greater the chief's supervisory effort, the more discriminating he is in the sense that a given increase in z causes a greater change (decrease) in the probability with which a deputy is fired.

A function $\lambda(z,e)$ that satisfies all of the above properties is $(1-z)^{\alpha}e^{\beta}$, $\alpha \geq 1, 0 < \beta \leq 1, \beta \leq 1$.

The representative deputy chooses z_t to maximize his discounted sum of expected utility, given by

$$V^D = \hat{u}_1 + \delta E u_{1t+1} + u_2((1-z_t)(T - s_t NR)/N - T/n) + \delta[(1-\lambda(z_t,e_t))u_2(R - T/n) + \lambda(z_t,e_t)Eu_2(c^*_{t+1})], \qquad (7)$$

where $\hat{u}_1$ is the utility obtained from the bliss level of public good consumption and u_{1t+1} is given by (3). Note that (7) incorporates the optimal choice a deputy would make as a member of the public and the fact that in the second period of his life a deputy enjoys the same consumption of the public good regardless of whether he is fired.

The optimal choice of z_t for the representative deputy is given by the first-order condition:[10]

$$u_2'((1-z_t)(T - s_t NR)/N - T/n)(T - s_t NR)/N = -\delta(\partial\lambda(z_t,e_t)/\partial z_t)(u_2(R - T/n) - Eu_2(c^*_{t+1})), \qquad (8)$$

10 Variable s_{t+1} is taken to be exogenous; see footnote 9.

which yields the implicit function $z_t^*(e_t;R,\ldots)$ where e_t is assumed to take on values such that (8) can be satisfied with equality by $z_t \in [0,1]$. This, in turn, determines the amount of the public good that is actually provided to be $z_t^*(T - s_t NR)/q$, as in (3).

3.3. The chief

The chief is chosen from individuals in the second (last) rather than the first period of their lives. I assume that the maximum utility obtained by the chief in the second period of his life always exceeds that obtainable by a deputy or the public. Every agent then prefers to be the chief rather than a deputy or a member of the public in the second period of his life, so that in the absence of internal promotion the chief is in effect chosen randomly from the population. In particular, he is not selected (by the other agents or by himself) on the basis of his ideal type of public good or his ph.

As mentioned above, the chief chooses how much of his one unit of time to allocate to supervision of his deputies. I assume that the rest of his time is allocated to devising ways to enrich himself at the expense of the public. The most simple formulation is to set $\tau_t = 1 - e_t$, so that we can replace $1 - \tau_t$ with e_t in equations (4) and (6) above. The chief's consumption of the private good is then given by $n(1 - e_t)l_t^*$.

Since the available funds (1) are exogenous to the chief (s_t having been determined by the actions of the previous chief), we can measure the extent to which his preferences over the public good are made effective by the share of those funds that is actually used to produce the type of public good he has chosen rather than winding up in the pockets of his deputies. Any measure of exercise of effective power should therefore be increasing in z^*. I denote such a measure by $P(z^*)$, where $P' > 0$ and $P'' \leq 0$.[11]

The chief's ph is measured by the random variable η, which is drawn from a distribution Ψ that maps $[\underline{\eta},\infty)$ into $[0,1]$, where $\underline{\eta}$ is defined below. In the absence of internal promotion, Ψ is the same as the fixed population distribution Φ. The utility of the chief is given by

$$V^C = \hat{u}_1 + u_2(n(1 - e_t)l_t^*) + \eta P(z_t^*). \tag{9}$$

If we assume that the chief acts as a Stackelberg leader and optimizes with respect to the functions l^* and z_t^*, his optimal choice of e_t is given by the first-order condition

$$u_2'(n(1 - e_t)l_t^*)n[l_t^* - (1 - e_t)(dl^*/de_t)] = \eta P'(z_t^*)(dz_t^*/de_t), \tag{10}$$

11 I have chosen to keep the specification of the function P as simple as possible. Undoubtedly, it should contain more arguments. For example, it seems reasonable that P should be increasing in n, the number of people over whom power is being exercised, though this is unimportant in the present context, since n is being treated as a constant.

where η is assumed to take on values such that (10) can indeed be satisfied with equality. We therefore define $\underline{\eta}$ as the minimum value of η such that (10) holds with equality. (10) yields the implicit function $e_t^*(\eta, \ldots)$.

3.4. Results

In each period, the model is technically an extensive-form game with the following order of moves: (1) Nature chooses the level of the chief's ph, η; (2) the chief chooses his level of supervisory effort, e; (3) the representative deputy observes e and chooses the share of funds under his control that he spends on the public good, z; (4) the public observes $e(= 1 - \tau)$ and z and chooses labour input to allocate to the modern or formal sector, l. The game is solved by backward induction.

In this equilibrium, the behaviour of the public, representative deputy, and chief is determined by the first-order conditions (6), (8), and (10). The key comparative static results are given in propositions 1–3. I provide intuition for each of them, confining all proofs to the appendix.

PROPOSITION 1. $dl^*/de > 0$. *Clearly the amount of labour the public allocates to marketed, taxable production as opposed to subsistence/informal sector, untaxable production will depend negatively on the tax rate and hence positively on the effort the chief spends supervising his deputies rather than plundering the public. This behaviour gives rise to an inverted-U relationship between the chief's supervision effort and his income (implicit tax revenue): when effort is zero, so that all marketed output is taxed away, then the public devotes zero labour to taxable output and implicit tax revenue is zero; but when effort is one, the tax rate is zero and implicit tax revenue is again zero. Under a condition derived in the appendix there will be no more than one local maximum for tax revenue for* $0 < e < 1$. *I denote the income-maximizing effort level by* $\hat{e}$.

PROPOSITION 2. $dz_t^*/de_t > 0$. *For the representative deputy, more intense supervision by the chief means that his probability of being fired increases more steeply with the percentage of funds under his control that he diverts into his own pocket* ($\partial^2 \lambda / \partial z \partial e < 0$). *This leads him to decrease this percentage or increase the percentage that he applies to provision of the public good.*

Note that proposition 2 implies that large-scale corruption and petty corruption always move together. The levels of large-scale and thus petty corruption are driven, in turn, by the ph of the chief:

PROPOSITION 3. $de_t^*/d\eta > 0$. *Since the right-hand side of (10) is positive, our definition of* $\underline{\eta}$ *ensures that* $e_t^* > \hat{e}$, *so that the chief always faces a trade-off between income and exercise of effective power. He is thus willing to increase his supervisory effort only when his desire to exercise effective power is stronger.*

In summary, the greater is the chief's ph, the lower is the rate of implicit taxation to which the public is subjected, the greater is the supply of the public good, and the greater is the supply of labour to the modern/formal sector.[12]

Note that since $\hat{e} > 0$, it is never optimal for the chief to spend zero effort on supervision of his deputies. If, for $e_t = \hat{e}$, (8) is satisfied for $z_t > 0$, this means that the government always supplies a positive amount of the public good. I leave it to the reader to decide whether this would be a realistic feature of the model.[13]

4. The model with internal promotion

We now suppose that a bureaucratic institutional structure exists such that there is 'promotion from within,' meaning that the next chief is chosen from the pool of deputies who are not fired. If all deputies are fired, the next chief is chosen randomly from the population, as in the previous section. As in Soskice, Bates, and Epstein (1992), internal promotion is assumed to be an institutional feature beyond the control of the chief. The analysis is greatly simplified if we assume that there is only one deputy ($N = 1$). (This assumption is also made by Soskice et al.) In the conclusions I will briefly discuss extension of the model to allow for more than one deputy.

Clearly, the existence of internal promotion does not affect the behaviour of the public derived in the previous section. For the chief, since z^* is now a function of the deputy's ph (as we will show immediately below) and is therefore a random variable, we must replace P in (9) with EP, where the expectation is computed using the density function φ associated with the fixed population distribution Φ that is defined in the previous section. Carrying this change through to (10), it is clear that the key result $de_t^*/d\eta > 0$ is unaffected. Internal promotion, of course, does qualitatively change the behaviour of the deputy. One effect is that it creates a greater incentive on the part of the deputy to avoid being fired and thus choose a high z_t, thereby reducing petty corruption. Here, we focus on the more novel result that internal promotion influences the behaviour of the deputy in such a way as to generate positive selection for the position of chief, thereby tending to reduce large-scale corruption as well.

Let the deputy's ph be measured by the random variable ξ. We can now rewrite (7) as

$$V^D = \hat{u}_1 + u_2((1 - z_t)(T - s_t NR)/N - T/n) + \delta[(1 - \lambda(z_t, e_t))(\hat{u}_1 + u_2(n(1 - e^*_{t+1})l^*_{t+1}) + \xi_{EP}(z^*_{t+1})) + \lambda(z_t, e_t)(Eu_{1t+1} + Eu_2(c^*_{t+1}))], \qquad (7')$$

12 We can also state that the greater is the chief's ph, the greater is the welfare of the public, under the sufficient condition that the distance between the chief's ideal type of public good and that of the public does not increase.

13 Rauch (1995a) contains comparative static analysis of changes in deputies' retirement compensation R and a discussion of how meritocratic recruitment of deputies could be incorporated into the model.

where e^*_{t+1} is the effort the current deputy will expend on supervision of his future deputy in the event that he becomes chief, and all expectations are computed using the density function φ (and with respect to the population distribution of the ideal type of public good where necessary), since the ph of the next deputy is drawn from the fixed population distribution Φ, as is that of the next chief if the current deputy is fired. We can simplify slightly by noting that $N = 1$ and that, because there is only one deputy who either becomes chief or is fired, there are never any retired deputies who need to receive compensation, so that $s_t = 0\ \forall\ t$. The deputy chooses z_t to maximize this simplified version of (7′), generating the first-order condition:

$$u_2'((1-z_t)T - T/n)T = -\delta(\partial\lambda(z_t, e_t)/\partial z_t)[\hat{u}_1 + u_2(n(1-e^*_{t+1})l^*_{t+1}) + \xi_{EP}(z^*_{t+1}) - (Eu_{1t+1} + Eu_2(c^*_{t+1}))]. \qquad (8')$$

(8′) yields the implicit function $z^*_t(e_t; \xi, \ldots)$, where, as in the previous section, e_t is assumed to take on values such that (8′) can be satisfied with equality by $z_t \in [0,1]$.

In the appendix we use (8′) to prove:

PROPOSITION 4. *$dz^*_t/d\xi > 0$. In contrast to the model without internal promotion, the deputy's ph now affects his behaviour: the higher his ph, the more he values promotion to chief, and the more funds he devotes to implementing the current chief's preferences over the public good to avoid being fired. Of course the result $dz^*_t/de_t > 0$ (proposition 2) from the previous section still holds.*

We see that the institution of internal promotion has introduced an element of selectivity into the drawing of the chief with regard to ph: the higher the deputy's ph, the more is he likely to become chief, and only if he is fired is the chief drawn randomly from the population distribution of ph.[14] This selectivity breaks the identity between Ψ, the chief's distribution of ph, and Φ, the population distribution of ph. What can we say about Ψ now?

To begin, fix the ph of the period t chief at η. It can then be shown that

$$\psi^\circ_{t+1}(\hat{\eta}) = \varphi(\hat{\eta})\left[(1 - \lambda(z^*_t(e^*_t(\eta), \hat{\eta}), e^*_t(\eta))) + \int_{\underline{\eta}}^{\infty} \varphi(a)\lambda(z^*_t(e^*_t(\eta), a), e^*_t(\eta))da\right], \qquad (11)$$

14 The reader might think that if we allowed agents to differ with respect to 'greed,' since the greedy more highly value promotion to chief, they would choose a higher z and be less likely to be fired. This would generate selection in favour of greed when the chief is drawn. The same greed also causes these agents to desire current income more intensely, however, leading them to choose a lower z. It turns out that if we measure greed by a parameter θ that multiplies u_2 and thus shifts the marginal utility of income, it can be shown (see appendix) that $dz^*_t/d\theta < 0$ in the internal promotion case. The reason is that a high θ makes the benefits of being chief, other than income (the bliss level of public good consumption and the exercise of effective power), relatively less important.

where $\psi^{\circ}_{t+1}(\hat{\eta})$ is the probability that the chief in period $t+1$ will have ph $= \hat{\eta}$. Intuitively, a chief of type $\hat{\eta}$ could be chosen in one of two ways: a deputy of type $\hat{\eta}$ could be chosen and promoted, or a deputy of any type could be fired and then a chief of type $\hat{\eta}$ could be chosen. Given η, the probabilities of the first and second events are given by the first and second terms of (11), respectively. Now we simply relax the assumption of a given ph for the period t chief and use (11) to obtain

$$\psi_{t+1}(\hat{\eta}) = \varphi(\hat{\eta}) \int_{\underline{\eta}}^{\infty} \psi_t(\eta) \Bigg[(1 - \lambda(z_t^*(e_t^*(\eta), \hat{\eta}), e_t^*(\eta))) + \int_{\underline{\eta}}^{\infty} \varphi(a) \lambda(z_t^*(e_t^*(\eta), a), e_t^*(\eta)) da \Bigg] d\eta, \qquad (12)$$

where $\int_{\underline{\eta}}^{\eta} \psi_t(b) db = \Psi_t(\eta)$ and $\psi_0 = \varphi$ if we define period 0 as the period in which internal promotion is first instituted. Finally, in the appendix we prove:

PROPOSITION 5. *Ψ 'improves' monotonically with time in the sense of first-order stochastic dominance: $\int_{\underline{\eta}}^{\eta} \psi_t(b) db \geq \int_{\underline{\eta}}^{\eta} \psi_{t+1}(b) db$, $t = 0, 1, \ldots$. Moreover, as t goes to infinity, ψ_t must converge to ψ^*, where ψ^* is defined by*

$$\psi^*(\hat{\eta}) = \varphi(\hat{\eta}) \int_{\underline{\eta}}^{\infty} \psi^*(\eta) \Bigg[(1 - \lambda(z^*(e^*(\eta), \hat{\eta}), e^*(\eta))) + \int_{\underline{\eta}}^{\infty} \varphi(a) \lambda(z^*(e^*(\eta), a), e^*(\eta)) da \Bigg] d\eta.$$

The intuition for proposition 5 is that a chief with a higher ph will spend more effort on supervision of his deputy and therefore be more discriminating in his firing (promotion) decision (condition (iii) on λ), which in combination with proposition 4 ensures that the selection process for chiefs will display positive feedback. Thus, the longer the institutional practice of internal promotion is in place, the greater is the expected ph of the chief. We see that this element of bureaucratic professionalization tends to decrease not only petty but also large-scale corruption, and through both mechanisms tends to increase the welfare of the public.[15]

5. Conclusions

In this paper I have argued that, in the absence of effective political oversight, internal promotion is a crucial institutional feature generating better performance from powerful state bureaucracies (the most powerful of which could include the nation's chief executive). Internal promotion acts to select for desire to exercise

15 Rauch (1995a) contains a discussion of how internal promotion might interact with meritocratic recruitment of the deputy.

effective power (ph) at the top of the hierarchy, with these individuals, in turn, restraining the corruption of their subordinates (deputies) as a byproduct of their efforts to implement their preferences over public goods using tax revenue, and also finding less time to carry out large-scale corruption of their own. It should be noted, however, that while internal promotion may lead on average to a greater share of the tax revenue collected to finance provision of public goods being spent for its intended purpose, it does not create any greater tendency for the mix of public goods supplied to match the preferences of the public. A secondary aim in this paper has been to disaggregate 'corruption' into two categories that are intended to be mutually exclusive but not exhaustive: creation and appropriation of rents, and misappropriation of tax revenue. In my model the levels of both types of corruption tend to move together, driven by the ph of the chief of the bureaucracy.

The analysis of internal promotion in section 4 was restricted to the case of one deputy. Extension of the model to allow for more than one deputy could generate both additional predictions and policy opportunities related to details of institutional design. In particular, with more than one deputy one could divide the bureaucracy into multiple departments supervised by a common chief. Consider the case, analysed in more detail by Rauch (1995a), in which there are two departments, one devoted to analysis or planning and the other devoted to operations. The operations department handles more funds and thus offers better opportunities for petty corruption, making it the more attractive department for all applicants, other things being equal. Suppose, however, that the planning department is the one in which future chiefs are 'groomed.' It is then possible that there will be self-selection for high (low) ph on the part of applicants to the planning (operations) department. This institutional set-up could explain the existence of 'pockets of efficiency' ('*bolsoes de eficiencia*'; see Geddes 1986, 105) in some otherwise corrupt bureaucracies. This example also illustrates a way in which the strength of selection for ph of the chief induced by internal promotion might be enhanced, with likely beneficial consequences for the welfare of the public.

In section 4, the chief's influence on the choice of the next chief was limited to firing or not firing the internal promotion candidate. A more general model that allows the chief a wider range of actions to influence that choice could be a topic for future research.

Appendix

Proof of proposition 1

The public's first-order condition (6) can be written as $e = f'(1 - l)$, implicitly determining $l^*(e)$. We then have $de = -f''dl^*$, or $dl^*/de = -1/f'' > 0$. ■

Condition ensuring no more than one local maximum for $(1 - e)l^*$: A sufficient condition is that the derivative of $(1 - e)l^*$ is always decreasing. This condition can be expressed in terms of derivatives of the production function f. We have $(d/de)[(1-e)l^*] = (1-e)dl^*/de - l^* = (1-e)(-1/f'') - l^*$; $(d/de)^2[(1-e)l^*] =$

$1/f'' + (1-e)f'''/(f'')^2 - dl^*/de = 2/f'' + (1-e)f'''/(f'')^2$. The condition can therefore be written as $2f'' + (1-e)f''' < 0$ or $2f'' + (1-f')f''' < 0$.

Proof of proposition 2
We differentiate the representative deputy's first-order condition (8) and rearrange to get $\{-u_2''[(T - s_t NR)/N]^2 + \delta(\partial^2\lambda/\partial z_t^2)(u_2(R - T/n) - Eu_2(c_{t+1}^*))\}dz_t^* = -\delta(\partial^2\lambda/\partial z_t \partial e_t)(u_2(R - T/n) - Eu_2(c_{t+1}^*))de_t$. Conditions (i) and (iii) on λ, $u_2'' < 0$, and the assumption that the deputy is worse off if fired ensure that the coefficients on both dz_t^* and de_t are positive. ■

Proof of proposition 3
We can rewrite the chief's first-order condition (10) as $\eta P'(z_t^*)(dz_t^*/de_t) + u_2' n(d/de_t)[(1 - e_t)l_t^*] = 0$. Clearly, this condition can be satisfied only if the second term is negative (if implicit tax revenue is increasing in τ_t). Differentiating and rearranging, we obtain $\{\eta P''(dz_t^*/de_t)^2 + P'(d^2 z_t^*/de_t^2) + u_2''\{n(d/de_t)[(1 - e_t)l_t^*]\}^2 + u_2' n(d/de_t)^2[(1 - e_t)l_t^*]\}de_t^* = -\eta P'(dz_t^*/de_t)d\eta$. The last two terms in the coefficient on de_t^* are negative and the first term is non-positive, while the second term is unsigned. The second term must be non-positive or dominated both for the second-order condition for a maximum to hold and for $de_t^*/d\eta > 0$ to hold. ■

Proof of proposition 4
We differentiate the deputy's first-order condition (8′) and rearrange to get $\{-u_2'' T^2 + \delta(\partial^2\lambda/\partial z_t^2)[\hat{u}_1 + u_2(n(1 - e_{t+1}^*)l_{t+1}^*) + \xi EP(z_{t+1}^*) - (Eu_{1t+1} + Eu_2(c_{t+1}^*))]\}dz_t^* = -\delta(\partial\lambda/\partial z_t)EP(z_{t+1}^*)d\xi$. The coefficients on dz_t^* and $d\xi$ are unambiguously positive. ■

Proof that $dz_t^*/d\theta < 0$: The deputy's first-order condition can now be rewritten as $u_2'((1 - z_t)T - T/n)T = -\delta(\partial\lambda(z_t, e_t)/\partial z_t)[\hat{u}_1/\theta + u_2(n(1 - e_{t+1}^*)l_{t+1}^*) + \xi EP(z_{t+1}^*)/\theta - (Eu_{1t+1}/\theta + Eu_2(c_{t+1}^*))]$, where we have divided through both sides by θ. It is clear that θ has the opposite effect on z_t^* from ξ. ■

Proof of proposition 5 We begin by noting that

$$\psi_{t+1}(\hat{\eta}) = \varphi(\hat{\eta}) \int_{\underline{\eta}}^{\infty} \psi_t(\eta) \Bigg[(1 - \lambda(z_t^*(e_t^*(\eta), \hat{\eta}), e_t^*(\eta))) + \int_{\underline{\eta}}^{\infty} \varphi(a)\lambda(z_t^*(e_t^*(\eta), a), e_t^*(\eta))da \Bigg] d\eta$$

$$= \varphi(\hat{\eta}) + \int_{\underline{\eta}}^{\infty} \varphi(\hat{\eta})\psi_t(\eta) \Bigg(\int_{\underline{\eta}}^{\infty} \varphi(a)\lambda(z^*(e^*(\eta), a), e^*(\eta))da - \lambda(z^*(e^*(\eta), \hat{\eta}), e^*(\eta)) \Bigg) d\eta, \qquad \text{(A1)}$$

where the first line is equation (12) in the text and in the second line we have dropped the time subscript everywhere except on ψ because all of the other *functions* are invariant with respect to time. Define

$$A(\hat{\eta},\eta) \equiv \int_{\underline{\eta}}^{\hat{\eta}} \varphi(b)\left(\int_{\underline{\eta}}^{\infty} \varphi(a)\lambda(z^*(e^*(\eta),a),e^*(\eta))da \right.$$

$$\left. - \lambda(z^*(e^*(\eta),b),e^*(\eta))\right)db.$$

Integrating both sides of (A1) from $\underline{\eta}$ to $\hat{\eta}$, we have

$$\Psi_{t+1}(\hat{\eta}) = \Phi(\hat{\eta}) + \int_{\underline{\eta}}^{\infty} \psi_t(\eta)A(\hat{\eta},\eta)d\eta. \tag{A2}$$

First we want to show that $\Psi_1(\hat{\eta}) \leq \Psi_0(\hat{\eta}) \equiv \Phi(\hat{\eta})$, that is, that the institution of internal promotion improves the distribution of the chief's ph even without positive feedback. Intuitively, this should hold because a higher ph deputy is more likely to be promoted: $\partial\lambda/\partial\hat{\eta} = (\partial\lambda/\partial z)(dz^*/d\hat{\eta}) < 0$. The proof uses this fact to establish that $A(\hat{\eta},\eta) < 0$ for $\underline{\eta} < \hat{\eta} < \infty$, which is sufficient to show that $\Psi_{t+1}(\hat{\eta}) \leq \Phi(\hat{\eta})$ by (A2). First, we note that $A(0,\eta) = A(\infty,\eta) = 0$. Then we show that $A(\hat{\eta},\eta)$ cannot have a local maximum:

$$\partial A/\partial\hat{\eta} = \varphi(\hat{\eta})\left(\int_{\underline{\eta}}^{\infty} \varphi(a)\lambda(z^*(e^*(\eta),a),e^*(\eta))da - \lambda(z^*(e^*(\eta),\hat{\eta}),e^*(\eta))\right)$$

$$\partial^2 A/\partial\hat{\eta}^2 = \varphi'(\hat{\eta})(\partial A/\partial\hat{\eta})/\varphi(\hat{\eta}) - \varphi(\hat{\eta})\partial\lambda/\partial\hat{\eta} > 0 \text{ when } \partial A/\partial\hat{\eta} = 0.$$

Next, if we can establish that $\Psi_{t+1}(\hat{\eta}) \leq \Psi_t(\hat{\eta})$ implies $\Psi_{t+2}(\hat{\eta}) \leq \Psi_{t+1}(\hat{\eta})$, then, since $\Psi_1(\hat{\eta}) \leq \Psi_0(\hat{\eta})$, we will have proved that the distribution of the chief's ph improves monotonically with time in the sense of first-order stochastic dominance. First-differencing (A2), we obtain

$$\Psi_{t+2}(\hat{\eta}) - \Psi_{t+1}(\hat{\eta}) = \int_{\underline{\eta}}^{\infty} (\psi_{t+1}(\eta) - \psi_t(\eta))A(\hat{\eta},\eta)d\eta. \tag{A3}$$

Integration by parts of the right-hand side of (A3) yields

$$(\Psi_{t+1}(\eta) - \Psi_t(\eta))A(\hat{\eta},\eta)|_{\eta=\underline{\eta}}^{\eta=\infty} - \int_{\underline{\eta}}^{\infty} (\Psi_{t+1}(\eta) - \Psi_t(\eta))(\partial A(\hat{\eta},\eta)/\partial\eta)d\eta,$$

which reduces (A3) to

$$\Psi_{t+2}(\hat{\eta}) - \Psi_{t+1}(\hat{\eta}) = -\int_{\underline{\eta}}^{\infty} (\Psi_{t+1}(\eta) - \Psi_t(\eta))(\partial A(\hat{\eta},\eta)/\partial\eta)d\eta \tag{A3$'$}$$

since $\Psi_{t+1}(\underline{\eta}) = \Psi_t(\underline{\eta}) = 0$ and $\Psi_{t+1}(\infty) = \Psi_t(\infty) = 1$. If we can now show that $\partial A(\hat{\eta}, \eta)/\partial\eta < 0$ for $\underline{\eta} < \hat{\eta} < \infty$, then (A3′) yields the desired result. The proof follows *exactly* the same lines as the proof that $A(\hat{\eta}, \eta) < 0$ for $\eta < \hat{\eta} < \infty$, substituting $\partial^2\lambda/\partial\hat{\eta}\partial\eta$ for $\partial\lambda/\partial\hat{\eta}$. Thus, we need only establish that $\partial^2\lambda/\partial\hat{\eta}\partial\eta < 0$. We have

$$\partial^2\lambda/\partial\hat{\eta}\partial\eta = [(\partial^2\lambda/\partial z^2)(dz^*/de) + \partial^2\lambda/\partial z\partial e](de^*/d\eta)(dz^*/d\hat{\eta}) + (\partial\lambda/\partial z)(d^2z^*/d\hat{\eta}de)(de^*/d\eta). \quad \text{(A4)}$$

It can be shown that $d^2z^*/d\hat{\eta}de > 0$. This is an example of what is called the 'responsiveness effect' in Rauch (1995a): deputies with higher ph have more to lose by being fired and thus increase z more in response to increases in the chief's supervisory effort. Thus, the responsiveness effect tends to make the chief's effort more effective in discriminating between high and low ph deputies as it increases with time. We can therefore see that of the three terms on the right-hand side of (A4) only the first term is non-negative. The intuition behind this ambiguity is that as the increased supervision by the chief drives the deputy to reduce his corrupt activities, the difference in behaviour between high and low ph deputies may narrow (in the most extreme case any deputy chooses $z_t = 1$ regardless of ph) so that supervision has less discriminatory effect. Assuming that the first term is dominated (it does not exist if $\partial^2\lambda/\partial z^2 = 0$), our proof that Ψ_t improves monotonically with time in the sense of first-order stochastic dominance is complete.

It remains to be shown that $\psi_{t+1}(\hat{\eta})$ converges to $\psi^*(\hat{\eta})$ as defined above. First, note that $\Psi_{t+1}(\hat{\eta})$ is a monotonic bounded sequence for each $\hat{\eta}$. It follows that $\Psi_{t+1}(\hat{\eta})$ must converge. Define $\Psi^*(\hat{\eta}) \equiv \lim_{t\to\infty}\Psi_{t+1}(\hat{\eta})$. Now integrate the second term on the right-hand side of (A2) by parts to obtain

$$\Psi_{t+1}(\hat{\eta}) = \Phi(\hat{\eta}) + A(\hat{\eta},\infty) - \int_{\underline{\eta}}^{\infty}\Psi_t(\eta)(\partial A(\hat{\eta},\eta)/\partial\eta)d\eta. \quad \text{(A2′)}$$

Using the monotone convergence theorem, we have

$$\Psi^*(\hat{\eta}) = \Phi(\hat{\eta}) + A(\hat{\eta},\infty) - \int_{\underline{\eta}}^{\infty}\Psi^*(\eta)(\partial A(\hat{\eta},\eta)/\partial\eta)d\eta.$$

Working backwards from (A2′) to (A1), we have our result.[16] ■

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16 I am indebted to Joel Sobel for help with this proof.

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