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# Corruption and Ideology in Autocracies

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Corruption is usually depicted in one of two ways: as stemming from a lack of government accountability, or from a lack of capacity. Neither depiction predicts that the structure of institutions meant to control corruption should vary across autocratic regimes. If corruption results from moral hazard between politicians and citizens, then all unaccountable governments should eschew anticorruption bodies. If rent-seeking stems from moral hazard between politicians and bureaucrats, all governments should create anticorruption bodies. We offer an explanation for why unaccountable governments vary in their willingness to create anticorruption institutions. Autocrats create such bodies to deter ideologically disaffected members of the populace from entering the bureaucracy. Anticorruption institutions act as a commitment by the elite to restrict the monetary benefits from bureaucratic office, thus ensuring that only zealous supporters of the elite will pursue bureaucratic posts. We illustrate these arguments with case studies of South Korea and Rwanda. (*JEL* D73, P48)

The literature on corruption, broadly speaking, points to two agency problems as the source of corrupt behavior. One such problem exists between the populace and its political leaders. A lack of government accountability gives rise to politicians' predatory behavior (e.g., Adersà et al. 2003). Political institutions, such as democracy, may serve as a check on these predatory tendencies. Alternative arguments point to an agency problem between governments and their bureaucrats as a source of corruption. The state's lack of policing capabilities may allow bureaucrats to predate on the population, regardless of the intentions of political leaders (e.g., Shleifer and Vishny 1993).

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Neither of these accounts, however, explains the substantial variation in the institutions designed to police corruption under autocratic rule.[1] If corruption is the result of the predatory behavior of politicians, we would not expect these same politicians to erect checks on their predation. If corruption stems from agency problems between political elites and bureaucrats, we would expect all governments to take steps to redress these problems—including the creation of effective bodies designed to police corruption.

In fact, nondemocratic regimes vary greatly in the extent to which they empower independent anticorruption bodies. For instance, in the People's Republic of China, the agencies nominally charged with corruption investigations are typically subservient to the regional-level party apparatuses they are meant to monitor. These bodies exercise little independence and thus, likely do little to curb corruption (Sun 2004). But, in other instances, anticorruption institutions are given real independent power—despite the fact that those most liable to prosecution are servants of the regime. For instance, the Park regime founded the Bureau of Audit and Inspection in Korea and the People's Action Party gave teeth to the Corrupt Practices Investigation Bureau in Singapore (Quah 1999).

In this article, we explore an alternative conception of corruption that, we argue, helps to explain variation in the creation of anticorruption bodies under autocratic rule. We contend that authoritarian rulers may tolerate, or even suborn, corrupt behavior as part of an incentive scheme designed to reward their supporters. However, the use of corruption in this manner gives rise to an adverse selection problem: opportunistic citizens may seek posts within the regime simply to gain access to corruption rents. Independent anticorruption agencies may act as a credible commitment to curtail corruption rents, thus ensuring the regime may staff positions with ideologically zealous supporters.

## 1. Argument

We contend that authoritarian states have an incentive to systematically rely on corruption as a means to motivate bureaucratic agents and ruling party members.[2] While corruption may impose large economic costs, it may also prove an opportune means of providing pecuniary benefits to those carrying out the rulers' will. In this sense, systematic corruption acts as a tool by which governments resolve moral hazard problems involving their subordinates.[3] Corrupt behavior and the efforts exerted

1. We focus on instances in which the public is unable to punish political leaders for corrupt behavior. We classify regimes where the threat of electoral sanction is absent as autocracies.

2. Wintrobe (1998), for instance, claims that the distribution of political rents can be used to purchase 'loyalty' under autocratic rule.

3. Leff (1964) argues that bribery may induce efficient performance by corrupt officials as bribes constitute an equivalent to a piece wage. Here we are less concerned with the incentives

by subordinate officials, therefore, act as strategic complements. The regime regulates the opportunities for corruption, and rewards its most loyal agents with the ability to partake in rents. Thus, the most corrupt officials are also likely to be the most loyal. Corruption, in our treatment, is tightly controlled by the government—it is not a manifestation of a lack of government control.[4]

For instance, the government may assign high-performing officials to posts made lucrative by access to corruption rents.[5] Loyal bureaucrats may be assigned to customs or procurement offices where there are ample opportunities to solicit bribes. By manipulating assignments in this manner, the elite increases the career concerns of lower-level officials.

Alternatively, the government may tolerate corruption by officials that toe the party line, but punish it by those that do not.[6] This selective manipulation of corruption—or of the punishments officials may expect to face for corrupt activities—may be seen as equivalent to the use of an efficiency wage. Corruption serves to increase the benefits from office and heightens the expected costs from removal.

This manipulation of corruption serves as a substitute for the use of high powered wage incentives. Rewarding officials through access to corruption rents may be preferable to wage incentives for a variety of reasons. First, such rewards can be provided at relatively low cost to the elite. The rulers need only turn a blind eye to the corrupt activities of productive officials rather than raising and distributing the funds for their wages. Second, corruption incentives can be manipulated in a nontransparent manner. This opacity may be useful insofar as it provides a shield from public scrutiny—and an autocratic elite may wish to encourage officials to behave in a manner viewed as undesirable by the public. Opacity also inhibits collective bargaining by officials—whether explicitly through unions or implicitly through informal networks. Access to

corruption introduces for bureaucratic performance with regards to the public, and more concerned with corruption's effect on the willingness of bureaucrats and party members to serve the elite. The moral hazard problem we focus on exists between the elite and its agents.

4. We abstract from corrupt behavior that arises in defiance of the ruling elite in our account. We note, however, that the additional rents that would accrue to subordinate officials from such corruption would enhance the returns to office, worsening the adverse selection problems we document below.

5. For the manipulation of assignment to posts as a means of controlling bureaucrats, see Iyer and Mani (2012). Lazarev (2007) documents how nondemocratic regimes may use the assignment of plum positions—those attracting large rents from office—as a means of attracting large numbers of new recruits.

6. Examples of this behavior abound: Urban (1985) notes that the Soviet Union implicitly encouraged officials to engage in prohibited—corrupt—behaviors, and would selectively prosecute those that did not show sufficient zeal in serving their superiors. During the early 1990s in the PRC, the Shanghai prosecutor's office announced that 'able individuals' would be granted leniency in corruption cases if they repented for their acts (Sun, 2001). Darden (2008) documents similar behavior under the Kuchma regime in Ukraine. Regional officials that were insufficiently zealous in backing the regime were often threatened with investigations and prosecution.

corruption can thus be manipulated to target the behavior of individual bureaucrats in a manner that is difficult through wage contracts. Unlike the typical official wage contract for bureaucrats, corruption incentives are likely to be high powered.[7]

The use of corruption rents as an incentive mechanism shapes public expectations about the returns to office. Members of the public expect that loyal government servants will escape corruption prosecutions, regardless of the extent of their corrupt acts. They believe that the government will assign lucrative posts as a reward for previous behavior and these beliefs will drive their expectations about the potential rewards of government service.

As a result of these beliefs, such service will likely seem an attractive option to a broad swath of the public, including those who have no particular love for their rulers. Since the ruling elite cannot directly observe the ideological predilections of those seeking government posts, and since those seeking such posts have every incentive to disguise their true beliefs, individuals disaffected with the ruling regime may enter government service and crowd out true ideological adherents. For instance, after assuming power in 1933, the Nazi Party was deluged with new members, many of whom were current civil servants or were seeking bureaucratic appointment. (Caplan 1988, pp. 167–168) claims that, "as civil servants sensibly flocked to join a party that put such a premium on political affiliation, so they devalued the meaning of membership as well as altering the character of the party itself."

In theory, the ruling elite could avoid such a problem if it could commit to rein in corruption. Should the elite crack down on corrupt behavior, the pecuniary benefits from bureaucratic office would decline and opportunists would be deterred from serving the regime. But we argue that, absent constraining institutions, the ruling elite cannot commit to such behavior, giving rise to an adverse selection problem.

This commitment problem arises from two underlying causes. First, in an authoritarian system, the ruling elite faces few constraints in its pursuit of its own self-interest. Second, attempts to combat corrupt behavior are likely to be costly for the elite. Policing corrupt behavior is likely to require greater resources than are necessary to manipulate access to corruption rents. More subtly, the punishment of lower-level bureaucrats for corrupt deeds may involve substantial costs. The prosecution and replacement of sitting officials is likely to sacrifice skill-specific human capital built up over time served in office (Gailmard and Patty 2007). Given the imperfect nature of monitoring technologies, such prosecutions may result in the removal of loyal servants from office. Finally, the prosecution of sitting officials is likely to cast a negative light on those responsible for their

7. On the prevalence of low-powered wage contracts for bureaucratic officials see Dixit (2002) and Tirole (1994). The incentives we describe are analogous to those employed by political machines in democracies (Banfield and Wilson, 1963; Robinson and Verdier, 2013).

appointment, potentially jeopardizing the standing of at least some members of the elite.

Consequently, the public will not find autocratic threats to limit corruption credible unless these threats are backed by the creation of constraining institutions. Independent anticorruption institutions may credibly act to limit corrupt behavior without interference by the ruling elite.

Delegation to independent anticorruption institutions gives rise to yet another commitment problem: How can an elite commit to ensure the continued independence (or indeed continued existence) of the anticorruption bodies it creates?

For anticorruption agencies to address the autocratic elite's credibility problem, the elite must suffer some cost from abolishing or subverting these agencies (Jensen 1997). We contend that an authoritarian elite seeking to undermine an independent anticorruption body would likely incur such costs, largely because attempts to subvert the anticorruption institution would be played out in public.[8]

Case studies of anticorruption commissions in the developing world reveal that success or failure of these bodies depends largely on institutional features—notably the scope of their investigative and prosecutorial authority. Once such authority is granted, subtle attempts to reduce the effectiveness of anticorruption agencies—through personnel changes or cuts—are unlikely to be effective.[9]

For the elite to eviscerate an established anticorruption body, it is likely necessary to alter the mandate given to that institution. Changes to the scope of the authority granted to anticorruption institutions likely require statutory changes—which may attract public notice. This danger is particularly great given that many anticorruption commissions are charged with public outreach.[10] The spectacle involved in undermining anticorruption bodies is likely to be particularly prominent and damaging if these entities have already launched effective investigations or prosecutions.[11]

Credible anticorruption may, therefore, enable the elite to screen jobseekers by restricting corruption rents. Credible anticorruption bodies

8. This claim mirrors Svolik (2012) and Boix and Svolik (2013) in pointing to the informational role of institutions in autocracies.

9. Bolongaita (2010), for instance, notes that the Corruption Eradication Commission (KPK) of Indonesia was able to secure a large number of high-level convictions with a relatively small number of personnel (580 staffers). Lawson (2009) finds that the Economic and Financial Crimes Commission (EFCC) in Nigeria was aggressive in pursuing political corruption despite the appointment of a chief that was handpicked by the president.

10. On the duties of anticorruption commissions in 18 countries, see Charron (2008). On the specific importance of public outreach to Botswana's anticorruption commission, see Heilbrunn (2004).

11. This is not to contend that all anticorruption institutions will prove effective (Heilbrunn, 2004). We merely contend that—conditional on having established an effective anticorruption institution in time $t$—the ruling elite will find it costly to abolish that institution in time $t+1$.

offer a public setting for the elite to demonstrate its commitment to refrain from corrupt behavior and to discourage corrupt activities on the part of its subordinates. As members of the public and party adjust their expectations regarding the rewards from office following such a commitment, those less ideologically aligned with the leadership's positions will leave or refrain from entering the bureaucracy.

## 2. Related Literature

This article builds on an emerging literature on the functioning of nondemocratic states and the role of institutions therein. Traditionally, most analysts have viewed nondemocratic regimes as constrained only by the effects of their present actions on future consumption (see, for instance, McGuire and Olson 1996), or by the threat of mass revolution (Acemoglu and Robinson 2000). However, a more recent literature suggests that nondemocracies may rationally seek to build institutions to constrain their power—usually to overcome some commitment problem. Myerson (2008) argues that an autocrat may promote the creation of institutions that allow subordinates to coordinate his ouster—as this allows the autocrat to credibly commit to reward these subordinates for their support (for a similar argument, see Gehlbach and Malesky forthcoming). Gandhi and Przeworski (2006) argue that dictatorships may commit to share rents with opposition groups by including the opposition in a legislature. We build on these arguments by suggesting that autocratic governments may seek to limit their ability to reward officials to shift the ideological composition of the pool of recruits to these positions.

We also build on the literature on agency problems in nondemocratic governments. Egorov et al. (2009) and Egorov and Sonin (2011) examine problems of moral hazard in dictatorships. These articles argue, respectively, that some dictatorships may have an incentive to encourage freedom of the press to increase monitoring of bureaucratic agents and that dictatorships have an incentive to promote less competent agents than democracies, given the danger that competent bureaucrats will stage a coup. Dixit (2010) argues that autocratic governments are less willing to share policy rents with bureaucrats than democratic governments and hence derive less effort from officials. We build on this literature by examining problems of adverse selection—and particularly adverse selection with respect to ideology—in nondemocratic governments.

We also borrow from the literature on agency problems with motivated agents. Besley and Ghatak (2005) examine the phenomenon in which bureaucrats develop a formal sense of mission, and note that the existence of such ideological interests allows the principal to relax high powered incentives. Prendergast (2007) examines the ideological motivations of regulators and characterizes the situations in which biased bureaucrats are preferred over nonideological alternatives. Prendergast also notes that ideological motivations may lead to adverse selection problems in recruiting agents. We characterize just such a problem here.

Finally, we build on an extensive literature on the institutional determinants of corruption. One strand of this literature focuses on how political accountability may limit government predation (Barro 1973; Ferejohn 1986). More recent work has emphasized how the effects of political accountability may be moderated by the amount of information available to the electorate (Adserà et al. 2003; Brunetti and Weder 2003; Ferraz and Finan 2008), by the presence or absence of checks and balances (Persson et al. 1997; Persson and Tabellini, 2000), by the clarity of lines of responsibility (Kunicová and Rose-Ackerman 2005), or by the role of opposition parties (Kunicová 2002). Here we offer an explanation for how ideology may influence corrupt behavior in the absence of electoral accountability.

An alternative institutional argument stresses the importance of state capacity for corruption. States that lack administrative capacity may prove unable to police the bureaucracy for corrupt behavior. Weak governments may be unable to coordinate bureaucratic corruption, resulting in particularly damaging competing demands for bribes (Shleifer and Vishny 1993). Countries with inadequate fiscal capacity may rely on corruption to ensure that civil servants receive wages sufficient to meet their participation constraint (Besley and McLaren 1993). Here we offer an argument as to how ideology may influence the level of corruption even within the set of capable states.

## 3. Model

### 3.1 Model Primitives

Consider an interaction between two classes of players: a government leadership ($L$) and a pool of potential bureaucratic recruits, where an individual recruit is denoted $i$ and $i$ is indexed over the unit interval $i \in [0, 1]$. $L$ will staff a single bureaucratic post with a recruit selected from the pool of potential recruits.

Potential recruits are characterized by their level of ideological affinity with the party in power $\alpha_i \in \{\underline{\alpha}, \overline{\alpha}\}$, where $0 < \underline{\alpha} < \overline{\alpha} < 1$.[12] We label individuals with values of $\alpha_i = \overline{\alpha}$ as zealots and those with values of $\alpha_i = \underline{\alpha}$ as opportunists. We further denote a term $\gamma \equiv \frac{\overline{\alpha}}{\underline{\alpha}}$, $\gamma \in (1, \frac{1}{\underline{\alpha}})$, which reflects the extent of *ideological polarization* within the recruitment pool. As $\gamma$ increases, the difference in the fealty of zealots and opportunists rises. The fraction of zealots in the recruitment pool is given by the parameter $p$, while the fraction of opportunists is given by $1 - p$.

12. Of course, in reality potential recruits may be characterized by factors other than their ideology—notably by their level of competence. We see no reason to expect that competence is systematically correlated with ideological support, and abstract from any consideration of potential recruits' competence in the model.

Potential recruits must determine whether to seek office and—conditional on entering office—the level of effort they wish to devote to serve the leadership $e_i \geqslant 0$. Should she not enter the bureaucracy, each potential recruit earns a private sector wage $y_i = y \geqslant 0$. If she enters the bureaucracy, she will enjoy a fixed official wage rate $w$ in addition to rents from office $r$, both of which are constrained to be non-negative.[13] We assume that rents are awarded by the leadership in a manner that is linear in production. Effort imposes a constant marginal cost equal to one on bureaucrats. When in office, the bureaucrat produces goods for the leadership according to the function $g(e_i) = 2e_i^{\frac{1}{2}}$.

Potential recruits value both income and the ideological returns to government service. If she enters office, each recruit $i$ will, therefore, enjoy ideological returns from service equal to $\alpha_i g(e_i)$ and rents equal to $rg(e_i)$. Her utility is thus:

$$u_i(\alpha_i, e_i) = \begin{cases} w + (r + \alpha_i)g(e_i) - e_i \text{ given entry} \\ y_i \text{ otherwise.} \end{cases} \tag{1}$$

The leadership determines both the wage rate paid to the official $w$, and the level of rents she may enjoy from service $r$. The pool of funds used to provide wages is derived from taxes—which, for simplicity, we treat as exogenous and fixed at $T > 0$.

In keeping with the literature on bureaucratic politics (Dixit 2002; Tirole 1994), we assume that official wages are unresponsive to effort levels—that is, they are contractually fixed by the leadership at the value $w$. By contrast, we contend that autocratic governments may manipulate access to rents to reward the performance of bureaucrats, providing relatively high-powered incentives for performance.

A second crucial difference between these two forms of remuneration lies in the leadership's ability to commit to each payment scheme. Official wages are fixed through contracts and law. Public sector unions (or informal groups of workers) may punish violations of official wage commitments through collective protest and strikes. Remuneration

13. The assumption that official wages are constrained to be non-negative is not innocuous. As we demonstrate below, reductions in official wages act as an alternative means for addressing adverse selection problems in bureaucratic recruitment. Were these wages infinitely flexible, no need for anticorruption commitments would arise. However, practical constraints limit the ability of governments to impose negative official wages—that is, to charge recruits fees for posts. While some governments have experimented with requirements that bureaucrats post bonds for office, these schemes have not been widely adopted—largely due to difficulties identified by Dickens et al. (1989). Requirements that bureaucrats pay for posts are likely to give rise to a variety of additional selection issues, largely due to the presence of credit/liquidity constraints—for a discussion of related issues see Hollyer (2011). Beyond the selection issues posed by the sale of offices, Guardado R. (2013) finds evidence that the sale of office directly undermines bureaucratic functions through mechanisms exogenous to those discussed in this article.

schemes centered on corruption rents, however, are surreptitious by nature. For obvious reasons, they are never specified in contracts—and the exact terms and levels of this remuneration are unlikely to be common knowledge even within the bureaucracy. Given the lack of an institutional framework for corrupt remuneration schemes, we assume that the leadership cannot commit *ex ante* to a given rate of corrupt remuneration for potential recruits.

Finally, the leadership may choose its level of anticorruption commitments. This may be thought of as representing a government's decision of whether to establish an independent anticorruption office, or to enter into an internationally sponsored anticorruption program. We treat these commitments as a continuous choice parameter $\lambda \geqslant 1$—where $\lambda = 1$ denotes an absence of anticorruption institutions and the extent of these institutions' mandates or resources is monotonically increasing in $\lambda$.

The presence of anticorruption institutions raises the costs to the leadership of engaging in or suborning rent-seeking. The costs to the leadership of rent-based remuneration is thus given by $\lambda R$, where $R = rg(e_i)$ denotes the pool of rents raised for such schemes.

Anticorruption bodies impose an additional direct cost on the elite. To the extent that such bodies are effective, they constrain corrupt behavior at both the elite and the petty level. We, therefore, assume that increasing the level of $\lambda$ imposes a direct penalty on the leadership, where the extent of this penalty is expressed by the parameter $\kappa > 0$.[14]

The leadership's utility is a function of the production of the lower-level official $g(e_i)$—which may include, but is not limited to, her official duties; the budget surplus $T - w$; the costs of rent-seeking $\lambda R$; and the extent of constraints on elite corruption $(1 - \lambda)\kappa$. We denote the leadership's utility as follows:

$$u_L(r, w, \lambda) = g(e_i) + T - w - \lambda R + (1 - \lambda)\kappa, \tag{2}$$

which it must maximize subject to the constraints that $R = rg(e_i)$, and $T \geqslant w$, in addition to the non-negativity constraints on $r$ and $w$.

In the event that the leadership is unable to staff the open post, we assume that it receives an arbitrarily large negative utility as a penalty.

The order of play of the game is as follows:

1. The party leadership sets an official wage rate $w \in [0, T]$ and chooses its level of anticorruption commitments $\lambda \geqslant 1$.
2. All potential recruits declare their willingness to enter office. Of those who express a willingness to enter, one is randomly chosen as an entrant.

14. $\kappa$ might also represent the direct costs of creating an effective anticorruption institution—that is, wages, equipment or mechanisms to ensure their independence. These costs may be thought to rise in the extent of the anticorruption body's authority $\lambda$. We would like to thank an anonymous reviewer for raising this point.

3. The leadership sets a contract for corrupt incentives $r \geqslant 0$. $i$ chooses her level of effort $e_i$ and production takes place.
4. Corruption revenues $R$ are raised, wages and rent-based incentives are paid, and all payoffs are realized.

The game is solved using backward induction, applying the perfect Bayesian equilibrium solution concept (Fudenberg and Tirole 1991).[15]

### 3.2 Equilibrium

Once in office, a bureaucrat will devote effort in a manner that maximizes equation (1), conditional on the level of corruption incentives $r$ and on her affinity with the ruling elite $\alpha_i$. This maximum will be given by the following expression:

$$e_i^* = (r + \alpha_i)^2.$$

The leadership will set values of $w$ and $r$ in light of the effort decision of the bureaucrat. The leadership, thus, seeks to maximize the following:

$$\begin{aligned} &\max_{w,r,\lambda} E[g(e_i^*) + T - w - \lambda R + (1 - \lambda)\kappa] \\ &\text{s.t. } R = rg(e_i^*) \\ &\qquad r \geqslant 0 \\ &\quad 0 \leqslant w \leqslant T \end{aligned} \tag{3}$$

where $E[\cdot]$ is the expectations operator.

The expectations operator is necessary in this instance as the leadership may be uncertain of the type of recruit it faces. If equilibrium rents and wages are sufficiently high—or private sector opportunities sufficiently poor ($y$ sufficiently low)—both opportunists and zealots may seek bureaucratic posts. If this is the case, then the recruit is a zealot with probability $p$ and an opportunist with probability $1-p$. If, however, the returns to public office are relatively low, then only zealots will be willing to serve. In this instance, the leadership can be certain of the type of recruit with whom it is dealing and may set rents accordingly. We denote $L$'s posterior beliefs over candidate ideology, given entry, as $q \equiv Pr(\alpha_i = \overline{\alpha} | \, entry)$, $q \in \{p, 1\}$.

The leadership's maximization problem implies that equilibrium rents are given by:

$$r^* = \max\left\{0, \frac{1}{2\lambda} - \frac{q\overline{\alpha} + (1-q)\underline{\alpha}}{2}\right\}. \tag{4}$$

15. We assume, throughout, that the bureaucracy is staffed by a single recruit. This is equivalent to assuming that there are enough zealots in the population of potential recruits to staff the bureaucracy.

Since the equilibrium rent $r^*$ depends on $q$, which represents $L$'s posterior beliefs over the bureaucrat's type given entry, the leadership is unable to commit to a rate of rent-based remuneration. *Ceteris paribus*, rents decline in $q$ because $L$ must offer higher rates of remuneration to the bureaucrat if it believes that this recruit may be an opportunist. The leadership cannot, absent constraining institutions, set these rates at a level sufficiently low to deter opportunist entry. Leaders must deal with the pool of bureaucratic recruits they have, not the pool they may wish to have. The critical question is, therefore, whether opportunists are willing to serve, given this equilibrium expression for the value of rents.

Recall that potential recruits derive a private sector wage of $y > 0$. A given potential recruit $i$, therefore, will be willing to enter office if and only if:

$$w + (\alpha_i + r^*)g(e_i^*) - e_i^* > y. \tag{5}$$

An adverse selection problem arises when inequality (5) is satisfied for opportunistic potential recruits.

The leadership possesses two tools through which it may redress such an adverse selection problem. First, it may lower the contractual wage rate $w$. This serves to reduce the expression on the left-hand side of inequality (5), directly dissuading opportunists from entering office. Second, the leadership may erect anticorruption institutions—that is, raise the value of $\lambda$. This serves to reduce the level of rents $r^*$ candidates may expect from office, as is given in expression (4). Lowering the level of rents serves to reduce the left-hand side of inequality (5), again dissuading opportunists from seeking posts.

Of the two tools at its disposal, the leadership always prefers to solve its adverse selection problem via wage reductions. Reductions in the value of $w$ are doubly beneficial to the leadership: they both directly improve its utility by increasing the budget surplus, and indirectly increase its utility by diminishing the incentive for opportunists to enter the bureaucracy.

However, for certain configurations of parameter values, the leadership cannot solve its adverse selection problem through reductions in the official wage alone. Under these circumstances, it may rely on the erection of anticorruption barriers to dissuade opportunists from entering posts. The need to rely on anticorruption barriers is costly for the leadership—they both raise the costs it faces from using rents to motivate bureaucrats and they directly diminish the elite's ability to consume rents for itself. Consequently, the leadership will rely on anticorruption bodies only when adverse selection issues persist even after official wages are reduced to the lowest possible level—that is, $w = 0$. Lemma 1 characterizes the circumstances under which such severe adverse selection problems exist.

*Lemma 1. When $w = 0$ and $\lambda = 1$, opportunists will seek to enter the bureaucracy iff $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$. When $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, the leadership may deter opportunists from entry by increasing $\lambda$ iff $\underline{\alpha} \leqslant \sqrt{y}$.*

Lemma 1 specifies two thresholds for $\underline{\alpha}$. If the ideological affinity opportunists feel for the elite is sufficiently low, the leadership may redress its adverse selection problem by manipulating official wages. That is, the leadership may set some wage rate $w > 0$ such that zealots are willing to enter the regime's service, while opportunists are not. If, by contrast, $\underline{\alpha}$ is sufficiently high, the leadership's adverse selection problem is insoluble. Recall that anticorruption commitments serve to redress this problem only by reducing the value of rents $r^*$. If opportunists are sufficiently ideologically motivated, they will enter office even when both $w$ and $r^*$ are pushed to zero.

The leadership will, therefore, be faced with an adverse selection problem, which it may choose to solve through anticorruption commitments if and only if $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \sqrt{y}]$. If $\underline{\alpha}$ falls outside of this interval, the leadership will never choose to erect anticorruption barriers—that is, it will set $\lambda = 1$—either because it can address its adverse selection problem through other methods or because it realizes this problem cannot be solved. In Appendix, we demonstrate that this interval is nonempty if private sector wages $y$ are sufficiently low.[16]

From Lemma 1, it follows that when $\underline{\alpha}$ is sufficiently high, the equilibrium value of official wages will be zero. $L$ will set a positive official wage rate $w$ only to satisfy the participation constraint of zealots. When $\underline{\alpha} \geqslant \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$ and anticorruption commitments are absent, the participation constraint for all potential recruits is satisfied when $w = 0$. Hence, in equilibrium $w = 0$. We state this result in the following remark:

*Remark 1. When* $\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p} < \underline{\alpha}$, $w = 0$.

To examine the creation and extent of anticorruption commitments, we will assume that the leadership can solve its adverse selection problem through such commitments. This amounts to a restriction on the value of $\underline{\alpha}$:

*Assumption 1.* $\underline{\alpha} < \sqrt{y}$

Assumption 1 guarantees that parameter values are such that the elite can solve any adverse selection problem by raising the value of $\lambda$. However, since increasing the value of $\lambda$ is costly for the leadership, we must characterize the conditions under which $L$ prefers to raise the value of $\lambda$ to a level sufficient to deter opportunist entry. The leadership must compare the costs and benefits of accepting adverse selection in bureaucratic recruitment instead of solving this problem.

16. More precisely, the interval is nonempty for $\sqrt{y} < \frac{1-p\overline{\alpha}}{1-p}$. Thus, the interval is nonempty for any $p, \overline{\alpha}$ if $y < 1$ –that is, the marginal cost of effort. As $p \to 1$, it is nonempty for any $y \in \mathbb{R}_+$. The range of values $\overline{\alpha}, y$ for which it is nonempty is rising in $p$, and the range of values $p, y$ for which it is nonempty is decreasing in $\overline{\alpha}$.

To undertake this comparison, we first characterize the value of $\lambda$ necessary to deter opportunist entry, which we denote $\overline{\lambda}$:

$$\overline{\lambda} = \max\{1, \lambda^*\} \tag{6}$$

where

$$\lambda^* = \frac{1}{2\sqrt{y} + p\overline{\alpha} - (1+p)\underline{\alpha}} \tag{7}$$

We derive $\overline{\lambda}$ by setting the equilibrium remuneration an opportunist can expect from attaining office equal to her participation constraint when $w=0$. For $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, such that opportunists have an incentive to seek government posts, $\overline{\lambda}$ takes on a value strictly greater than one—specifically, $\overline{\lambda} = \lambda^*$. For $\underline{\alpha} \leqslant \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, opportunists eschew posts, even absent anticorruption commitments. Thus, the value of $\overline{\lambda}$ is equal to 1.

We can now consider $L$'s decision with regard to equilibrium levels of $\lambda$. On the one hand, $L$ may raise $\lambda$ to $\overline{\lambda}$ and ensure that the bureaucracy is staffed only with the most zealous possible recruits. (It will never raise $\lambda > \overline{\lambda}$ since, as noted above, this serves only to impose a cost by limiting the elite's ability to consume rents.) Alternatively, when $\overline{\lambda} = \lambda^* > 1$ (i.e., when $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$), $L$ may set $\lambda = 1$ and accept the potential presence of opportunists in the bureaucracy. Proposition 1 characterizes this decision for different ranges of the parameter $\underline{\alpha}$.

*Proposition 1.* If $\underline{\alpha} \leqslant \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, *then L will set* $\lambda = \overline{\lambda} = 1$.
*If* $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}]$, *L will set* $\lambda = \lambda^* > 1$ *iff the following inequality holds:*
$\frac{1}{2\lambda^*} + \gamma\underline{\alpha}\Big(1 + \frac{\gamma\underline{\alpha}\lambda^*}{2}) + (1-\lambda^*)\kappa \geqslant \frac{[1+\underline{\alpha}[1+q(\gamma-1)]]^2}{2}$. *Otherwise, L sets* $\lambda = 1$.
*If* $\underline{\alpha} > \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}$, *L* will set $\lambda = \lambda^* > 1$ *iff the following inequality holds:*
$2\overline{\alpha} + (1-\lambda^*)\kappa \geqslant \frac{[1+\underline{\alpha}[1+q(\gamma-1)]]^2}{2}$. *Otherwise, L sets* $\lambda = 1$.

Proposition 1 divides the parameter space for $\underline{\alpha}$ into three ranges, defined by two inequalities. The first inequality, $\underline{\alpha} < \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, follows directly from Lemma 1. For sufficiently low levels of $\underline{\alpha}$, no opportunist seeks entry into the bureaucracy, and thus the equilibrium value of $\lambda$ is equal to $\overline{\lambda} = 1$. The second inequality, $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} > \underline{\alpha}$, dictates whether the equilibrium rent rate $r^*$ is positive when $\lambda = \lambda^* > 1$. Thus, if $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}]$, $L$ may solve its adverse selection problem by erecting anticorruption barriers that lower equilibrium rents $r^*$. If $\underline{\alpha} > \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}$, then $L$ can successfully deter opportunists from entry only by raising barriers to corruption to such levels that rents are eliminated altogether ($r^* = 0$).

### 3.3 Comparative Statics

We now turn our attention to the comparative statics of the model, which will be expressed in terms of the equilibrium level of $\lambda$. The equilibrium value of $\lambda$ will be dictated by two considerations. First, what level of commitment is necessary to deter opportunists from office? Second, given this value, is the leadership willing to undertake this commitment?

We first state the following lemma:

*Lemma 2. There exists a threshold* $\hat{\alpha} = \frac{1}{p}[(1+p)\underline{\alpha} + 1 - 2\sqrt{y}]$ *such that for* $\overline{\alpha} \geqslant \hat{\alpha}$*, the equilibrium value of* $\lambda$ *is given by* $\overline{\lambda} = 1$.

This threshold is defined by the condition under which opportunists seek to enter the bureaucracy when $\lambda = 1$. When $\overline{\alpha}$ exceeds this threshold, no opportunists ever seek to enter the bureaucracy and $\overline{\lambda} = 1$. In other words, $\underline{\alpha}$ will always fall into the first range of the parameter space defined by Proposition 1, $\underline{\alpha} < \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, when $\overline{\alpha} \geqslant \hat{\alpha}$. By contrast, when $\overline{\alpha} < \hat{\alpha}$, $\overline{\lambda} = \lambda^* > 1$. $L$ can solve its adverse selection problem only by erecting anticorruption barriers.

Having stated this lemma, we now consider the effects of varying the degree of ideological polarization within the pool of potential recruits. To do so, we fix the affinity of opportunists $\underline{\alpha}$, which must be as specified by Assumption 1, and vary the affinity of zealots $\overline{\alpha}$. This is equivalent to varying the parameter $\gamma \equiv \frac{\overline{\alpha}}{\underline{\alpha}}$, where higher values of $\gamma$ denote higher levels of ideological polarization.

*Proposition 2. Consider two values of* $\gamma \in \{\gamma', \gamma''\}$*, where* $\gamma' < \gamma''$*. Each value of* $\gamma$ *has an associated value of* $\overline{\lambda} \in \{\overline{\lambda}', \overline{\lambda}''\}$ *where* $\overline{\lambda}' \geqslant \overline{\lambda}''$*. If L sets* $\lambda = \overline{\lambda}'$ *when* $\gamma = \gamma'$*, then it also sets* $\lambda = \overline{\lambda}''$ *when* $\gamma = \gamma''$.

Loosely speaking, as ideological polarization $\gamma$ rises, $L$ grows (weakly) more willing to establish anticorruption commitments. The intuition for this result is straightforward: An increase in the level of polarization implies that the desirability of recruiting a zealous supporter (as opposed to an opportunistic one) is rising. The cost of any adverse selection problem becomes more severe as polarization rises. Thus, the leadership is more willing to bear the cost of anticorruption commitments when $\gamma$ is high than when it is low.

This relationship is weak because, for some parameter values, $L$ will never be willing to enact anticorruption commitments. Recall that these commitments limit the ability of the elite to consume rents for themselves. The extent of the resultant costs is parameterized by the term $\kappa$. When $\kappa$ is sufficiently high, the elite will never erect anticorruption barriers, regardless of the extent of ideological polarization. We summarize these results with the following remark:

*Remark 2. Define a value of* $\kappa \equiv \overline{\kappa}$ *such that, for* $\kappa \geqslant \overline{\kappa}$, $\lambda = 1$ *for all values of* $\gamma$. *For* $\kappa < \overline{\kappa}$, *there exists a corresponding threshold value of* $\gamma \equiv \overline{\gamma}(\kappa)$ *such that L will set* $\lambda = \overline{\lambda} \geqslant 1$ *for any* $\gamma \geqslant \overline{\gamma}(\kappa)$ *and will set* $\lambda = 1$ *for any* $\gamma < \overline{\gamma}(\kappa)$.

Proposition 2 does not suffice to characterize the equilibrium value of $\lambda$ because $\lambda^*$, the level of anticorruption commitments necessary to deter opportunists when $\underline{\alpha} > \frac{2\sqrt{\gamma}+p\overline{\alpha}-1}{1+p}$, depends on the value of $\gamma$. To characterize the relationship between equilibrium levels of anticorruption commitments and polarization, it is necessary to consider the relationship between $\lambda^*$ and $\gamma$.

The value of $\lambda^*$ is given by expression (7). Holding opportunists' affinity for the regime $\underline{\alpha}$ fixed, an increase in zealots' zealotry $\overline{\alpha}$—or, equivalently, an increase in the value of $\gamma$—decreases the value of $\lambda^*$ given by this expression. Hence, $\lambda^*$ is decreasing in values of $\gamma$, and thus the value of $\overline{\lambda}$ is weakly decreasing in $\gamma$. The intuition for this claim is as follows: holding all else constant, as the affinity zealots feel for the regime, $\overline{\alpha}$, rises, the rate of rents, $r^*$, decreases. In expectation, zealous recruits are willing to devote greater effort for less pecuniary reward; thus $L$ has an incentive to lower rents. However, as the rate of rents falls, opportunists are less willing to seek office. Thus, $L$ can deter opportunists' entry with a lower value of anticorruption commitments.

This result indicates that the relationship between ideological polarization $\gamma$ and the equilibrium level of anticorruption commitments may be nonmonotonic. Remark 2 allows us to state this claim more precisely:

*Proposition 3. When* $\kappa < \overline{\kappa}$, *the equilibrium value of* $\lambda$ *is nonmonotonic in* $\gamma$. *For values of* $\gamma < \overline{\gamma}(\kappa)$, *the equilibrium value of* $\lambda = 1$. *At* $\gamma = \overline{\gamma}(\kappa)$, *the equilibrium value of* $\lambda$ *jumps to* $\overline{\lambda} = \lambda^* > 1$. *For all values of* $\gamma > \overline{\gamma}(\kappa)$, *the equilibrium value of* $\lambda = \overline{\lambda} \geqslant 1$*—and* $\overline{\lambda}$ *is (weakly) decreasing in* $\gamma$. *When* $\kappa \geqslant \overline{\kappa}$, *the equilibrium value of* $\lambda = 1$ *for all values of* $\gamma$.

We plot the equilibrium value of $\lambda$ for varying values of $\gamma$ in Figure 1.

We now turn our attention to shifts in the proportion of zealots in the recruitment pool $p$. We state the relationship between $p$ and the equilibrium value of $\lambda$ in the following proposition:

*Proposition 4. The equilibrium value of* $\lambda$ *is weakly decreasing in* $p$.

To be more precise, the equilibrium value of $\lambda$ is strictly decreasing in $p$ for some configuration of parameter values and invariant for others. In the following remark, we clarify the conditions under which values of $\lambda$ are decreasing in $p$.

*Remark 3. If, when* $p = 1$, $\overline{\alpha} \leqslant \hat{\alpha}$, *we can define a threshold value of* $p \equiv \tilde{p}$ *such that, for all* $p \leqslant \tilde{p}$, *the equilibrium value of* $\lambda = \overline{\lambda} \geqslant 1$, *and for all* $p > \tilde{p}$,

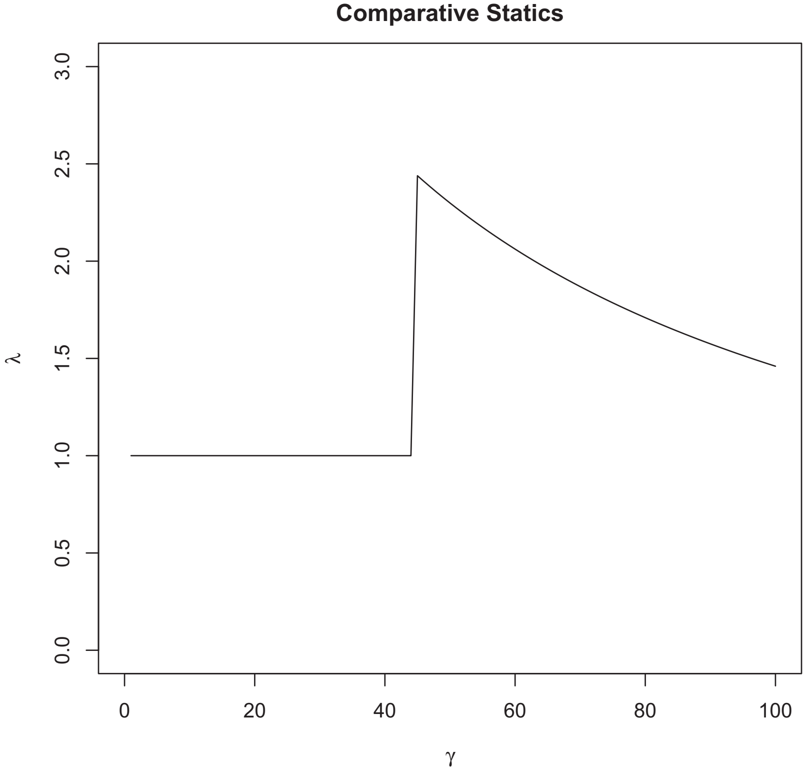


Figure 1. The Equilibrium Value of Anticorruption Commitments as a Function of Polarization. The equilibrium value of $\lambda$ as a function of $\gamma$. Parameter values are fixed such that $\underline{\alpha} = 0.01$, $p = 0.5$, and $\kappa = 0.1$.

*the equilibrium value of $\lambda = 1$. $\lambda^*$ is strictly decreasing in p, and thus $\overline{\lambda}$ is weakly decreasing in p. $\tilde{p}$ is interior to the unit interval for sufficiently small values of $\kappa$.*

A decrease in the value of $p$ has two effects. First, and most directly, it worsens any adverse selection problems faced by the elite. As the recruitment pool becomes increasingly dominated by opportunists, the odds that any given recruit is a zealot fall. Consequently, redressing this problem by enacting anticorruption commitments becomes more attractive. Second, and less directly, the decline in the proportion of zealots implies that the elite must rely more heavily on pecuniary incentives to motivate bureaucratic effort. Holding all else constant, the value of $r^*$ rises as $p$ falls. To deter opportunists from seeking office, therefore, $L$ must erect more severe anticorruption barriers. Thus, the value of $\lambda^*$ increases.

Of course, as $\overline{\lambda} = \max\{1, \lambda^*\}$ increases, the costs the leadership faces in solving its adverse selection problem also rise. Thus, as $p$ falls, both the costs and benefits of deterring opportunists increase. For sufficiently low values of $\kappa$, the rise in benefits outpaces the rise in costs—for high values of $\kappa$, this is no longer true.

To summarize the results of our comparative statics examination: anticorruption commitments in autocratic regimes tend to fall as the breadth of the regime's support ($p$) rises and are nonmonotonic (first rising then falling) in the level of ideological polarization. Adverse selection in bureaucratic recruitment is most costly when the regime enjoys the support of only a small number of zealous backers, who are likely to be crowded out of the recruitment process by opportunists. The incentive to screen candidates is thus highest when $p$ is small. Similarly, as the polarization between zealots and opportunists ($\gamma$) rises, the incentive to screen candidates increases. But—since the rate of rents, and thus the pecuniary rewards from office, decline in $\gamma$—so too does the level of commitment necessary to achieve this screening effect. Thus the equilibrium value of $\lambda$ first rises, then falls, as polarization increases, as Figure 1 illustrates.

### 3.4 Extension: Observability of Ideology

Until this point, we have considered the ideological affinity of a potential recruit for bureaucratic office $\alpha_i$ as wholly unobservable. This assumption seems reasonable, as the political elite is unable to observe the thoughts of those seeking posts. Moreover, those wishing to obtain a position within the government have every incentive to disguise their true beliefs.

But, in many instances, the ideological beliefs of potential recruits are correlated with observable factors. For instance, cues such as ethnicity, place of birth, or parental occupation may correlate with ideological affinity for the regime.[17] Ethnicity may play a particularly important role in this regard. Ethnic identities are observable and difficult to change or conceal (Chandra 2006) and, in many polities, political leaders rely heavily on ethnically based appeals to maintain support.

To incorporate observable types, we consider an interaction that is isomorphic to the one depicted above. Only now, potential recruits can be characterized by their observable type $\chi_i \in \{\underline{\chi}, \overline{\chi}\}$. We denote the fraction of the population with characteristic $\underline{\chi}$ as $x \in (0, 1)$ and the fraction of the population with characteristic $\overline{\chi}$ as $1 - x$. Without loss of generality, let $\chi_i = \underline{\chi}$ if $i \leqslant x$ and $\chi_i = \overline{\chi}$ if $i > x$. Type may thus represent a potential recruit's ethnicity or geographic background.

Further assume that the proportion of ideological zealots may differ across observable types $\chi_i$. Let $z_1$ denote the fraction of potential recruits of type $\underline{\chi}$ who are zealots, and let $z_2$ denote the same with regards to potential recruits of type $\overline{\chi}$. As before, $p$ will denote the fraction of zealots in the entire population—implying that $xz_1 + (1 - x)z_2 = p$. Without loss

17. These factors were all identified as influencing the advancement of military officials under the Rhee regime in our case study of South Korea (Kim, 1971).

of generality, we assume that $z_2 > z_1$. $z_j, j \in \{1, 2\}$ is thus a reflection of the correlation between ideology and observable type.

The game proceeds exactly as before, except we now assume that in the first period of play the leadership may restrict the set of potential recruits eligible for office to those of type $\underline{\chi}$ or $\overline{\chi}$, or it may choose not to impose restrictions.

Under these circumstances, the leadership always prefers to restrict the pool of eligible candidates to those whose type indicates that they are more likely to be zealots—that is, to those for whom $\chi_i = \overline{\chi}$. In so doing, the leadership increases the likelihood with which any given potential recruit is a zealous type.

One may trivially extend the conclusions of Proposition 4 to cover this case, only here the parameter $z_2$ replaces the parameter $p$ in that proposition. Thus, as $z_2$—the correlation between observable type and ideological affinity for the regime—increases, the equilibrium value of $\lambda$ must weakly decline. Moreover, since $z_2 > p$, the leadership is (weakly) less likely to enact anticorruption commitments when ideology is partially observable than when it is wholly unobservable. Ethnic or geographic polarization serves to reduce anticorruption commitments.

## 4. Illustrative Cases

Our theory thus advances several hypotheses. First, the equilibrium value of anticorruption commitments should be rising as the size of the pool of zealots falls. Second, the creation of credible and capable anticorruption bodies is less likely in states that are characterized by ethnic or geographic cleavages. Finally, we can make predictions about the effects of shifts in the value of ideological parameters. Consider a country that currently lacks anticorruption institutions and where polarization is low. Proposition 3 holds that any increase in polarization will (weakly) increase anticorruption commitments. This is equivalent to a shift from the far left of Figure 1 toward the right.

Unfortunately, these hypotheses do not readily lend themselves to large-N analysis. Measures of the distribution of ideological support for autocratic leaders are few and of dubious quality. We therefore choose to demonstrate our argument through a discussion of several illustrative cases.

Our empirics focus on changes within countries over time. We thus attempt to minimize confounding covariates—to the extent possible in a qualitative analysis—by holding time-invariant country characteristics constant. While our cases are consistent with model predictions, we cannot claim that they offer definitive support for the theory we advance. Our model is limited—it abstracts from many significant political and economic factors. The countries we consider experience substantial economic and political shocks over the period we cover, which may have influenced decisions to establish anticorruption agencies independently of the ideological changes that are our central concern. One should see our case studies as evidence of the plausibility of the claims, we advance, rather than as definitive tests.

### 4.1 Korea under the Rhee and Park Regimes

Syngman Rhee was elected president of South Korea in 1948, and elections continued throughout his tenure (1948–60). But, his rule was marked by ballot-rigging and assassinations of political opponents (Haggard 1990; Kim 1971; Moran 1998). The prospect of electoral sanctioning was far-fetched—electoral accountability was minimal.

Rhee's rule was notable for its lack of ideological underpinnings and the disconnect between the executive and any mass political movements (Kim 1971, p. 22).[18] A party of government—the Liberal Party—was created in 1951, but, it never developed a grass-roots following (Cole and Lyman 1971; Han 1974). Rhee thus lacked stalwart ideological supporters—levels of both $\overline{\alpha}$ and $p$ were low.

Corruption flourished under Rhee's rule.[19] At the petty level, corruption was particularly rife in the police and military—institutions whose activities were crucial to Rhee's grip on power. Members of the military, particularly senior members, could profit from their positions by selling equipment on the black market. One general was said to have commented on corruption: "Everyone is in it. Privates steal on foot. Officers steal in jeeps. Generals steal by trucks" (Clifford 1998, p. 91). Military and police officials were placed in positions to benefit from such graft by virtue of their reputation for loyal service to the Rhee regime (Kim 1971).[20] In keeping with model primitives that treat rents $r$ as a motivation for bureaucratic effort, it seems that Rhee tolerated corruption by senior officials to encourage their activities on behalf of his regime.

These conditions persisted until Rhee was ousted and, subsequently, Park Chung-Hee was installed in power via a military coup. The leadership of this coup primarily consisted of lower-tier military officers possessed of a nationalistic and developmentalist ideology (Kim 1971, p. 100).

The Park regime rallied popular support based on a revolutionary-nationalist ideology that emphasized the importance of work, clean government, and development that appealed to the public at large, and particularly to the lower tiers of the military. These ideological appeals increased Park's popularity such that, following his assassination in 1979, an estimated 9.5 million Koreans turned out to pay respects at his funeral

18. In a notable example, Rhee dissociated himself from the Korean Democratic Party (KDP) —on whose ticket he had run—immediately after assuming power. He appointed a cabinet all but devoid of KDP members (Han, 1974).

19. At the elite level, this corruption largely consisted of the preferential allocation of export licenses and funds from US-sponsored aid to political backers (Haggard, 1990; Moran, 1998).

20. Promotion and hiring decisions were also influenced by observable characteristics—for example, geographic background—that were associated with support for Rhee.

(Clifford 1998). However, this support was not universal. Han (1974) notes that Korean society was ideologically polarized at the time Park assumed power. In rigged elections in 1963, Park barely received a plurality of votes (Kim 1971). To summarize using our terms, the parameter $\overline{\alpha}$ was high and the value of $p$ was intermediate.

In terms of our model, therefore, Korea under Syngman Rhee occupied a portion of the parameter space to the far left of Figure 1. Even the most zealous backers of the regime showed scant intrinsic motivation to serve Rhee's government. Consequently, anticorruption barriers were never created. Rhee's removal, and Park's rise to power, led to a sharp increase in the value of $\overline{\alpha}$, while values of $\underline{\alpha}$ remained constant. Park did inspire intense loyalty from ideological adherents—even if the population was not uniformly zealous. This increased polarization resulted in a shift to the right in Figure 1. The polarized nature of popular support for the Park government created the appropriate conditions for institutional reform.

Park did set about implementing such institutional reforms. Immediately after assuming power, Park dislodged and jailed a number of corrupt officials and military officers, and expropriated the wealth of several Rhee-era profiteers (Haggard 1990; Wedeman 1997). Park established Korea's first anticorruption agency—the Board of Audit and Inspection (BAI) —in 1963 (Quah, 1999). Regulations of many business practices were relaxed, reducing the room for bureaucrats to solicit bribes. These reforms led to a decline in petty corruption—ultimately increasing the technocratic nature of the Korean bureaucracy (Haggard 1990).[21]

### 4.2 Rwanda under the Kagame Regime

In our second case study, we examine changes in corrupt behavior in Rwanda during the period in which Paul Kagame tightened his grip on power, gradually forcing out members of the rebel coalition that brought him to office. During this process, Kagame alienated a substantial portion of his initial coalition (reduced the level of $p$) even as he retained the steadfast support of a core group of backers ($\overline{\alpha}$ remained high). Under such circumstances, our model would predict that the ruling elite would become inclined to rely on anticorruption institutions to protect itself from an adverse selection problem that might emerge were corruption tolerated.

Following the 1994 genocide, the Rwandan government came under the control of the Rwanda Patriotic Front (RPF) —a former rebel group led by Tutsi exiles from the previous regime. Though the RPF initially ruled in a national coalition with other parties under the terms of the Arusha Accords (which put an end to the Rwandan civil war) (Golooba-Mutebi 2008), by the end of the 1990s, the RPF assumed an increasingly dominant

21. While Park vigorously policed corruption at the petty level, corruption persisted at the elite level (Wedeman, 1997, 467).

and autocratic position (Reyntjens 2004). Its leader, Paul Kagame, became president following the resignation of several political opponents in April 2000, and his position was reaffirmed by elections (widely criticized for irregularities) in August 2003. While in power, the RPF has enjoyed the strong support of a group of former Tutsi exiles—particularly those who found exile in Uganda. This fierce loyalty was forged both by experiences during the RPF-led insurrection against the previous regime, and by experiences during the ensuing genocide (Eriksen 2005). Its support in the wider Rwandan populace, and indeed even within the Tutsi minority, was far more tenuous (ICG 2002; Rafti 2004; Reyntjens 2004).

The Tutsi minority comprises a relatively small proportion (roughly 15%) of the Rwandan population (ICG 2002). Consequently, the Tutsi-dominated RPF has long been concerned with its levels of popular support and distrustful of electoral politics, given the danger that parties could form along ethnic lines (ICG 2002). However, ethnicity became a less valid predictor of ideological support over time. Kagame cemented his control of the political system in years after the 1994 peace agreements, sidelining his opponents. By the late 1990s, Tutsi-led and multiethnic opposition parties began to emerge, as former allies were removed from the coalition and alienated from the RPF dominated government (Rafti 2004). Even some former members of the RPF broke with the regime. Kagame, therefore, had to be increasingly concerned about his narrow base of popular support (the low values of the parameter $p$). Moreover, he could no longer be fully certain which citizens fully backed the regime.

Thus, over time, Kagame's base of support narrowed ($p$ fell), though the intensity of his most ardent supporters ($\overline{\alpha}$) remained high. In keeping with our model's predictions, Rwanda has created a host of anticorruption institutions.[22] Notably, the 2003 constitution granted extensive protections for the independence of the judiciary and created the Office of Ombudsman charged with rooting out corruption (Rugege 2007). In the same year, Rwanda also passed an anticorruption law that both delineates offenses and punishment and requires that "every institution and public establishment" establish an internal auditing body.[23]

Levels of petty corruption in Rwanda declined in the years following the chaos of civil war and have remained quite low relative to peer states.

22. Of course, other factors may also have played a role in driving the creation of such institutions. Notably, Rwanda relies heavily on international and bilateral aid—and these donors have pushed recipient states to take steps to curtail corruption. However, despite high levels of aid dependence, Rwanda has been resistant to international pressure on a variety of issues, particularly related to the curtailment of opposition rights and support for militia movements in the neighboring Democratic Republic of the Congo (DRC). See, for instance, Kampf (August 16, 2013) and French (September 24, 2009).

23. Law Aimed at Preventing, Suppressing, and Punishing Corruption and Related Offenses. http://www.ombudsman.gov.rw/Documents/AMAT.URW.ENGa/Law%20No%2023-2003%20on%20Prevention%20Suppression%20and%20Punishment%20of%20Corruption.pdf. Last accessed on October 10, 2011.

The Mo Ibrahim Foundation ranked Rwanda 10th in Africa on its measure of Accountability and Corruption in 2010.[24] The World Bank's Doing Business Survey found that only 20% of firms ranked corruption as a 'major constraint' to business in 2006 (as opposed to 52% in the Gambia, 84% in Guinea, and 11% in Namibia).[25]

## 5. Conclusion

In this article, we have advanced an argument that predicts (a) when authoritarian governments are likely to tolerate or engage in corruption and (b) when such governments are likely to construct anticorruption institutions. Our argument offers several novel contributions to the literature on corruption. First, we contend that corruption may not always be the result of problems of moral hazard. Indeed, sometimes it is a solution to such problems. Authoritarian governments are able to manipulate access to corruption rents in a manner that provides high-powered incentives targeted to specific lower-level officials in a manner that is opaque to the public. While other authors have suggested that corruption may have some role in solving principal-agent problems between the government and officials (Besley and McLaren 1993; Lazarev 2007), we are the first, to our knowledge, to suggest that governments may systematically manipulate corruption as a means to address the moral hazard problem inherent in motivating lower-level officials.[26]

Second, we argue that corruption results in an adverse selection problem in the recruitment of agents. Authoritarian governments cannot commit to refrain from rewarding high-performing officials with access to corruption rents. This inability to commit implies that those who feel little ideological sympathy for the ruling elites' aims may be drawn into office when levels of corruption are high.

Third, we offer an account—based on ideology—of when authoritarian governments are likely to adopt anticorruption institutions. Such governments will seek to tie their own hands and restrict their ability to manipulate corruption when they enjoy the strong support of a small cadre of zealots, but the broader portion of the population is ambivalent—or even hostile—to their rule. Under such circumstances, the costs of the adverse selection problem described above are at their greatest, and the incentive to adopt anticorruption institutions is consequently high.

24. http://www.moibrahimfoundation.org/en/section/the-ibrahim-index. Last accessed on October 10, 2011.

25. All data are retrieved from the World Bank's African Development Indicators, available at http://databank.worldbank.org/ddp/home.do. Last accessed on October 10, 2011.

26. Darden (2008) advances a similar argument—he notes that graft can be systemized in a manner that reinforces state hierarchies. Darden particularly notes that the threat of prosecution for graft can act to increase the power of incentives, and documents the manipulation of the threat of punishment in this manner in Ukraine. His argument does not, however, discuss the implications of corruption for selection into bureaucratic and party offices.

A natural question that emerges from this line of research is whether the mechanisms identified here are also at work in democracies. We believe that they are, though to a lesser extent. As in many autocratic political systems, party elites in democratic party 'machines' routinely manipulate access to corruption to provide incentives for lower-level officials.[27] And, logically, any political system that relies on such a system of incentives may encounter adverse selection problems similar to those described in this article.

The willingness and ability of democratic governing elites to employ such an incentive system is weakened, however, as a system of checks and balances or competing political parties becomes developed. Democratic governments are unlikely to be able to disburse corruption rents at low cost when opposition parties may notice and publicize their illicit activities, or when independent judicial bodies investigate and sanction corrupt acts.

To the extent that political parties in democracies develop coherent ideologies, the mechanisms we document here are less likely to hold sway. In competitive elections between ideological parties, potential bureaucratic recruits are likely to be uncertain of the eventual victor (Przeworski 2005). Opportunists are less likely to enjoy a continual stream of benefits from mimicking zealots when parties rotate in office than they would under single-party rule. When ideologically differentiated parties rotate in power, adverse selection is therefore less likely to be a major concern in bureaucratic selection.

More broadly, our article offers insight into the debate as to whether political institutions are primarily responsible for corruption. This view is often advanced in the literature and is contrasted by findings that emphasize the importance of culture (Barr and Serra 2010; Fisman and Miguel 2007). Our findings suggest that political institutions may play a somewhat subtler role than that emphasized elsewhere. Legal institutions help to limit corruption, but their emergence is conditional on ideology. Moreover, the gap in levels of corruption between democratic and autocratic regime types will also be conditioned by ideology—ideological polarization gives rise to the incentive for autocratic regimes to commit to curtail corrupt behavior.

## Appendix A

### Proofs of Theoretical Propositions

A. Characterizing an Equilibrium. We characterize a perfect Bayesian Nash equilibrium in pure strategies for this interaction. A perfect Bayesian equilibrium requires that (1) player beliefs are consistent with the strategy

27. See Carpenter (2001) on patronage practices in the US federal government before the Pendleton reforms. For more journalistic accounts, see Royko (1971) and Ackerman (2005).

profile; (2) that each player's strategy constitutes a best response, given her beliefs and the strategies of all other players; and (3) beliefs are updated according to Bayes' Rule, wherever possible. In this game, a strategy for a potential recruit $i$ consists of (1) a mapping from her ideology, official wage, and expected rents into an entry decision, $\{\underline{\alpha}, \overline{\alpha}\} \times \mathbb{R}_+ \times \mathbb{R}_+ \rightarrow \{0, 1\}$; and (2) a mapping from her ideology and rents into an effort level, $e_i : \{\underline{\alpha}, \overline{\alpha}\} \times \mathbb{R}_+ \rightarrow \mathbb{R}_+$. A strategy for the leadership $L$ consists of a mapping from candidate ideologies $\alpha_i$ and the proportion of zealots $p$ into a wage rate, $w : \{\underline{\alpha}, \overline{\alpha}\} \times [0, 1] \rightarrow \mathbb{R}_+$; (2) a mapping from candidate ideologies and the proportion of zealots into the level of anticorruption commitments, $\lambda : \{\underline{\alpha}, \overline{\alpha}\} \times [0, 1] \rightarrow [1, \infty)$; and (3) a mapping from candidate ideologies and posterior beliefs over ideology given entry $q$ into a level of rents, $r : \{\underline{\alpha}, \overline{\alpha}\} \times [0, 1] \rightarrow \mathbb{R}_+$. Posterior beliefs are defined as $q = Pr(\alpha_i = \overline{\alpha} | entry)$ where $q \in \{p, 1\}$.

*Lemma 1.* When $w = 0$ and $\lambda = 1$, opportunists will seek to enter the bureaucracy iff $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$. When $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, the leadership may deter opportunists from entry by increasing $\lambda$ iff $\underline{\alpha} \leqslant \sqrt{y}$.

*Proof.* Equilibrium levels of effort are given by $e_i^* = (r + \alpha_i)^2$, whereas the equilibrium value of $r$ is as given in expression (4). Substituting these values into expression (5) when $w = 0$, and recognizing $q = p$ when candidates of all types choose to enter office, yields:

$$(\alpha_i + r^*)g(e_i^*) - e_i^* > y$$

$$\Leftrightarrow \frac{1}{2\lambda} - \frac{p\overline{\alpha} - (1+p)\underline{\alpha}}{2} > \sqrt{y}.$$

Substituting $\lambda = 1$ yields the expression $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$. Increasing the value of $\lambda$ can push $r^*$ to zero, but no lower. Substituting $r^* = 0$ into the above expression yields $\underline{\alpha} > \sqrt{y}$. Thus, opportunist entry will take place for $\lambda = 1, w = 0$ if $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \sqrt{y}]$. If $\underline{\alpha} > \sqrt{y}$, entry will take place for $w = 0$ and any value of $\lambda \geqslant 1$. □

Note further that the interval $(\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \sqrt{y}]$ will be nonempty iff:

$$\frac{2\sqrt{y} + p\overline{\alpha} - 1}{1+p} < \sqrt{y}$$

$$\Leftrightarrow \sqrt{y} < \frac{1 - p\overline{\alpha}}{1 - p}$$

The RHS of this inequality is strictly positive, so this may hold for values of $y$ sufficiently small.

The inequality defined in the proof of Lemma 1 also provides our definition of $\lambda^*$ in expression (7). This is the value of $\lambda$ such that:

$$\frac{1}{2\lambda} - \frac{p\overline{\alpha} - (1+p)\underline{\alpha}}{2} = \sqrt{y}$$

$$\lambda^* = \frac{1}{2\sqrt{y} + p\overline{\alpha} - (1+p)\underline{\alpha}.}$$

Given the constraint that $\lambda \geqslant 1$, we have $\overline{\lambda} = \max\{1, \lambda^*\}$.

*Proposition 1.* If $\underline{\alpha} \leqslant \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, then $L$ will set $\lambda = \overline{\lambda} = 1$.
If $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}]$, $L$ will set $\lambda = \lambda^* > 1$ iff the following inequality holds:
$\frac{1}{2\lambda^*} + \gamma\underline{\alpha}(1 + \frac{\gamma\underline{\alpha}\lambda^*}{2}) + (1-\lambda^*)\kappa \geqslant \frac{[1+\underline{\alpha}[1+q(\gamma-1)]]^2}{2}$. Otherwise, $L$ sets $\lambda = 1$.
If $\underline{\alpha} > \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}$, $L$ will set $\lambda = \lambda^* > 1$ iff the following inequality holds:
$2\overline{\alpha} + (1-\lambda^*)\kappa \geqslant \frac{[1+\underline{\alpha}[1+q(\gamma-1)]]^2}{2}$. Otherwise, $L$ sets $\lambda = 1$.

*Proof.* Lemma 1 establishes that opportunists will refrain from entry when $\lambda = 1$ and iff $\underline{\alpha} \leqslant \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$. Thus, if this condition holds, $\overline{\lambda} = 1$. $L$ will set $\lambda = \overline{\lambda} = 1$, since raising $\lambda$ any higher than this value provides no benefit and incurs a cost.

For $\underline{\alpha} > \frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}$, $\overline{\lambda} = \lambda^* > 1$ following from expressions (6) and (7). Thus, for this range of values of $\underline{\alpha}$, $L$'s decision of whether to set $\lambda = \lambda^* > 1$ depends on its expected utility from deterring opportunist entry as opposed to tolerating this entry. This decision will, in turn, be contingent on the equilibrium value of rents $r$.

The value of $r$ is constrained to be non-negative. Substituting $\lambda^*$ into expression (4) tells us that, when $\lambda = \lambda^* > 1$, rents will be non-negative if:

$$\frac{1}{2\lambda^*} - \frac{\overline{\alpha}}{2} \geqslant 0$$
$$\Leftrightarrow \frac{2\sqrt{y} - (1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$$

and $r = 0$ when $\lambda = \lambda^* > 1$ otherwise.

We can now derive the $L$'s utility when $\lambda = \lambda^* > 1$ and $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$:

$$E[u_L(r, w, \lambda = \lambda^*)] = \frac{1}{\lambda^*} + \overline{\alpha} - \frac{1}{2\lambda^*} + \frac{\lambda^*\overline{\alpha}^2}{2} + (1-\lambda^*)\kappa + T$$

and when $\lambda = \lambda^* > 1$ and $\underline{\alpha} \in (\frac{2\sqrt{y}+p\overline{\alpha}-1}{1+p}, \frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p}]$:

$$E[u_L(r, w, \lambda = \lambda^*)] = 2\overline{\alpha} + (1-\lambda^*)\kappa + T.$$

By contrast, $L$'s expected utility from setting $\lambda = 1$ when $\underline{\alpha} > \frac{2\sqrt{\overline{y}}+p\overline{\alpha}-1}{1+p}$ is given by:

$$E[u_L(r, w, R, \lambda = 1)] = \frac{[1 + q\overline{\alpha} + (1 - q)\underline{\alpha}]^2}{2}$$

Substituting $\overline{\alpha} = \gamma\underline{\alpha}$ into this expression yields the inequalities in Proposition 1. $\square$

These conditions define the equilibrium. Each candidate $i$ will set effort levels such that $e_i = (r + \alpha_i)^2$ and will enter the bureaucracy if expression (5) is satisfied. $L$ will set $r$ according to expression (4). The equilibrium value of $\lambda$ is as dictated by Proposition 1, for varying ranges of the parameter $\underline{\alpha}$. Finally, $L$ will set $w = 0$ if $\underline{\alpha} > \frac{2\sqrt{\overline{y}}+p\overline{\alpha}-1}{1+p}$ (following Lemma 1) and will set $w \geqslant 0$ such that the participation constraint for zealots is satisfied at equality otherwise. Finally, beliefs are defined such that:

$$Pr(\alpha_i = \overline{\alpha} | \, entry) \equiv q = \begin{cases} 1 \text{ if } \lambda = \overline{\lambda} \\ p \text{ otherwise.} \end{cases}$$

Comparative Statics.

*Lemma 2.* There exists a threshold $\hat{\alpha} = \frac{1}{p}[(1 + p)\underline{\alpha} + 1 - 2\sqrt{\overline{y}}]$ such that for $\overline{\alpha} \geqslant \hat{\alpha}$, the equilibrium value of $\lambda$ is given by $\overline{\lambda} = 1$.

*Proof.* Notice that this threshold is the threshold for opportunist entry given by Lemma 1. Thus, when $\overline{\alpha} > \hat{\alpha}$, no opportunist will enter the bureaucracy when $\lambda = 1$, implying that $q = Pr(\alpha_i = \overline{\alpha} | \, entry) = 1$ when $\lambda = 1$. Substituting $\overline{\alpha} = \hat{\alpha}$ into the expression for $\lambda^*$ yields $\overline{\lambda} = 1$. For any $\overline{\alpha} > \hat{\alpha}, \overline{\lambda} = 1$. Thus, $E[u_L(r, w, \lambda = \overline{\lambda})] = E[u_L(r, w, \lambda = 1)]$—the conditions for Proposition 1 are always satisfied at equality. $\square$

*Proposition 2.* Consider two values of $\gamma \in \{\gamma', \gamma''\}$, where $\gamma' < \gamma''$. Each value of $\gamma$ has an associated value of $\overline{\lambda} \in \{\overline{\lambda}', \overline{\lambda}''\}$ where $\overline{\lambda}' \geqslant \overline{\lambda}''$. If $L$ sets $\lambda = \overline{\lambda}'$ when $\gamma = \gamma'$, then it also sets $\lambda = \overline{\lambda}''$ when $\gamma = \gamma''$.

*Remark 2.* Define a value of $\kappa \equiv \overline{\kappa}$ such that, for $\kappa \geqslant \overline{\kappa}$, $\lambda = 1$ for all values of $\gamma$. For $\kappa < \overline{\kappa}$, there exists a corresponding threshold value of $\gamma \equiv \overline{\gamma}(\kappa)$ such that $L$ will set $\lambda = \overline{\lambda} \geqslant 1$ for any $\gamma \geqslant \overline{\gamma}(\kappa)$ and will set $\lambda = 1$ for any $\gamma < \overline{\gamma}(\kappa)$.

*Proof.* First notice that when $\overline{\alpha}$ exceeds the threshold given by Lemma 2 for a given value of $\gamma = \gamma'$, it also exceeds that threshold for $\gamma'' > \gamma'$. Thus, in both instances, the equilibrium value of $\lambda = \overline{\lambda} = 1$.

We now must consider values of $\gamma'' > \gamma'$ such that $\overline{\alpha}$ is less than the threshold defined by Lemma 2. For such values, $E[u_L(r, w, \lambda = 1)] = \frac{[1+p\overline{\alpha}+(1-p)\underline{\alpha}]^2}{2}$ and $\overline{\lambda} = \lambda^* > 1$.

We now demonstrate that, for such values, $\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial\overline{\alpha}} > \frac{\partial E[u_L(r,w,\lambda=1)]}{\partial\overline{\alpha}}$. $\frac{\partial E[u_L(r,w,\lambda=1)]}{\partial\overline{\alpha}} = [1+p\overline{\alpha}+(1-p)\underline{\alpha}]p$. When $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} > \underline{\alpha}$, we have $\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial\overline{\alpha}} = 2-\kappa\frac{\partial\lambda^*}{\partial\overline{\alpha}}$. Given that $2 > [1+p\overline{\alpha}+(1-p)\underline{\alpha}]$ and $\frac{\partial\lambda^*}{\partial\overline{\alpha}} < 0$, this expression is always strictly greater than $\frac{\partial E[u_L(r,w,\lambda=1)]}{\partial\overline{\alpha}}$.

Now consider when $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \leqslant \underline{\alpha}$:

$$E[u_L(r,w,\lambda=\lambda^*)] = \frac{2\sqrt{y}+p\overline{\alpha}-(1+p)\underline{\alpha}}{2}+\overline{\alpha} + \left(\frac{\overline{\alpha}^2}{2}-\kappa\right)\frac{1}{2\sqrt{y}+p\overline{\alpha}-(1+p)\underline{\alpha}}+\kappa+T$$

$$\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial\overline{\alpha}} = \frac{p}{2}+1+\overline{\alpha}\lambda^*-\left(\frac{\overline{\alpha}^2}{2}-\kappa\right)p\lambda^{*2}$$

$$\frac{p}{2}+1+\overline{\alpha}\lambda^*-\left(\frac{\overline{\alpha}^2}{2}-\kappa\right)p\lambda^{*2} \geqslant [1+p\overline{\alpha}+(1-p)\underline{\alpha}]p$$
$$\Rightarrow \frac{1}{p}+\frac{\overline{\alpha}\lambda^*}{p}-\left(\frac{\overline{\alpha}^2}{2}-\kappa\right)\lambda^{*2} \geqslant \frac{1}{2}+p\overline{\alpha}+(1-p)\underline{\alpha}$$

The LHS of this inequality is monotonic and decreasing in $p$ and monotonic and increasing in $\kappa$. The RHS, by contrast, is monotonic and increasing in $p$ and invariant in $\kappa$. Thus, if this inequality holds when $p=1$ and $\kappa=0$, it holds everywhere.

At $p=1$ and $\kappa=0$ this simplifies to:

$$1+\overline{\alpha}\overline{\lambda}-\frac{\overline{\alpha}^2}{2}\lambda^{*2} \geqslant \frac{1}{2}+\overline{\alpha}$$

$$\alpha\left[\lambda^*-1-\frac{\overline{\alpha}}{2}\lambda^{*2}\right] \geqslant -\frac{1}{2}$$

The LHS of this inequality is monotonic and increasing in $\lambda^*$. When $\lambda^* = 1$ (its minimal value), we have $-\frac{\overline{\alpha}^2}{2} \geqslant -\frac{1}{2}$ which is true by definition of $\overline{\alpha} < 1$. Thus this inequality holds for all parameter values. This, in turn, implies that $\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial\overline{\alpha}} > \frac{\partial E[u_L(r,w,\lambda=1)]}{\partial\overline{\alpha}}$ for all parameter values.

We now consider the limits of both sides of the expressions given in Proposition 1 as $\gamma\to 1$.

$$\lim_{\gamma\to 1} E[u_L(r,w,\lambda=1)] = \lim_{\gamma\to 1}\frac{[1+\underline{\alpha}[1+p(\gamma-1)]]^2}{2} = \frac{[1+\underline{\alpha}]^2}{2}$$

If $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} < \underline{\alpha}$:

$$\lim_{\gamma\to 1} E[u_L(r,w,\lambda=\lambda^*)] = \lim_{\gamma\to 1} 2\gamma\underline{\alpha}+(1-\lambda^*)\kappa = 2\underline{\alpha}+(1-\lambda^*)\kappa$$

Given $\frac{(1+\underline{\alpha})^2}{2} > 2\underline{\alpha}$ and $\lambda^* \geqslant 1, \kappa > 0$, we know the former expression is strictly greater than the latter expression. Thus, the relevant inequality in Proposition 1 can never hold.

Now consider the situation when $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$:

$$\begin{aligned}\lim_{\gamma\to 1} E[u_L(r, w, \lambda = \lambda^*)] &= \lim_{\gamma\to 1} \frac{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}}{2} + \gamma\underline{\alpha} + \kappa \\ &\quad + \left(\frac{\gamma^2\underline{\alpha}^2}{2} - \kappa\right)\frac{1}{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}} \\ &= \sqrt{y} + \frac{\underline{\alpha}}{2} + \kappa + \left(\frac{\underline{\alpha}^2}{2} - \kappa\right)\frac{1}{2\sqrt{y} - \underline{\alpha}}\end{aligned}$$

We now have:

$$\sqrt{y} + \frac{\underline{\alpha}}{2} + \kappa + \left(\frac{\underline{\alpha}^2}{2} - \kappa\right)\frac{1}{2\sqrt{y} - \underline{\alpha}} < \frac{(1+\underline{\alpha})^2}{2}$$

$$\kappa > \frac{\underline{\alpha}^2}{2} - \frac{1}{2\lambda^*}$$

The RHS of this expression is strictly negative for all $r \geqslant 0$ (which is guaranteed by $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$), whereas $\kappa$ is strictly positive. Thus, as $\gamma \to 1$, the inequalities in Proposition 1 can never hold.

We now consider the limits of both sides of the expressions given in Proposition 1 as $\gamma \to \frac{1}{\underline{\alpha}}$.

$$\begin{aligned}\lim_{\gamma\to\frac{1}{\underline{\alpha}}} E[u_L(r, w, \lambda = 1)] &= \lim_{\gamma\to\frac{1}{\underline{\alpha}}} \frac{[1 + \underline{\alpha}[1 + p(\gamma - 1)]]^2}{2} \\ &= \frac{[1 + p + (1-p)\underline{\alpha}]^2}{2}\end{aligned}$$

If $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} < \underline{\alpha}$:

$$\begin{aligned}\lim_{\gamma\to\frac{1}{\underline{\alpha}}} E[u_L(r, w, \lambda = \lambda^*)] &= \lim_{\gamma\to\frac{1}{\underline{\alpha}}} 2\gamma\underline{\alpha} + (1-\lambda^*)\kappa \\ &= 2 + (1-\lambda^*)\kappa\end{aligned}$$

Notice that, for $\underline{\alpha} < 1, 2 > \frac{[1+p+(1-p)\underline{\alpha}]^2}{2}$. Thus, as $\kappa \to 0$, the latter limit exceeds the former limit. Moreover, $2 + (1-\lambda^*)\kappa$ is monotonically decreasing in $\kappa$, so there must be some value of $\kappa \equiv \overline{\kappa}$ such that the latter limit is strictly greater than the former if $\kappa < \overline{\kappa}$, while the former limit weakly exceeds the latter for $\kappa \geqslant \overline{\kappa}$.

Now consider the situation when $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$:

$$\lim_{\gamma\to 1} E[u_L(r, w, \lambda = \lambda^*)] = \lim_{\gamma\to 1} \frac{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}}{2} + \gamma\underline{\alpha} + \kappa + \left(\frac{\gamma^2\underline{\alpha}^2}{2} - \kappa\right)\frac{1}{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}}$$

$$= \frac{1+\lambda^{*2}}{2\lambda^*} + 1 + \kappa(1-\lambda^*)$$

Notice that $\frac{1+\lambda^{*2}}{2\lambda^*} + 1 > \frac{[1+p+(1-p)\underline{\alpha}]^2}{2}$ implying that, as $\kappa \to 0$, this limit must exceed the corresponding limit for $E[u_L(r, w, \lambda = 1)]$. Moreover, this limit is monotonic and decreasing in $\kappa$, so there must exist some value of $\kappa \equiv \overline{\kappa}$ such that the this limit is strictly greater than the corresponding limit for $E[u_L(r, w, \lambda = 1)]$ if $\kappa < \overline{\kappa}$, while the former limit weakly exceeds the latter for $\kappa \geqslant \overline{\kappa}$.

Thus, for all parameter values, $\lim_{\gamma\to 1} E[u_L(r, w, \lambda = 1)] > \lim_{\gamma\to 1} E[u_L(r, w, \lambda = \lambda^*)]$. When $\kappa < \overline{\kappa}$, $\lim_{\gamma\to \frac{1}{\underline{\alpha}}} E[u_L(r, w, \lambda = 1)] < \lim_{\gamma\to \frac{1}{\underline{\alpha}}} E[u_L(r, w, \lambda = \lambda^*)]$. So, their must exist a value $\overline{\alpha}$ such that $E[u_L(r, w, \lambda = 1)] = E[u_L(r, w, \lambda = \lambda^*)]$. Moreover, $\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial\overline{\alpha}} > \frac{\partial E[u_L(r,w,\lambda=1)]}{\partial\overline{\alpha}}$ implying that (1) this intersection is unique, and (2) that for all values of $\overline{\alpha}$ greater than that at this intersection $E[u_L(r, w, \lambda = \lambda^*)] > E[u_L(r, w, \lambda = 1)]$. □

*Proposition 3.* When $\kappa < \overline{\kappa}$, the equilibrium value of $\lambda$ is nonmonotonic in $\gamma$. For values of $\gamma < \overline{\gamma}(\kappa)$, the equilibrium value of $\lambda = 1$. At $\gamma = \overline{\gamma}(\kappa)$, the equilibrium value of $\lambda$ jumps to $\overline{\lambda} = \lambda^* > 1$. For all values of $\gamma > \overline{\gamma}(\kappa)$, the equilibrium value of $\lambda = \overline{\lambda} \geqslant 1$—and $\overline{\lambda}$ is (weakly) decreasing in $\gamma$.

When $\kappa \geqslant \overline{\kappa}$, the equilibrium value of $\lambda = 1$ for all values of $\gamma$.

*Proof.* Proposition 2 and Remark 2 establish that, when $\kappa < \overline{\kappa}$, the equilibrium value of $\lambda = \overline{\lambda} \geqslant 1$ iff $\gamma \geqslant \overline{\gamma}(\kappa)$. Otherwise $\lambda = 1$.

$\overline{\lambda} = \max\{1, \lambda^*\}$ where $\lambda^* = \frac{1}{2\sqrt{y}+p\gamma\underline{\alpha}-(1+p)\underline{\alpha}}$. $\lambda^*$ is monotonic and decreasing in $\gamma$, and thus $\overline{\lambda}$ is weakly decreasing in $\gamma$. These two results establish the proposition. □

*Proposition 4.* The equilibrium value of $\lambda$ is weakly decreasing in $p$.

*Remark 3.* If, when $p = 1$, $\overline{\alpha} \leqslant \hat{\alpha}$, we can define a threshold value of $p \equiv \tilde{p}$ such that, for all $p \leqslant \tilde{p}$, the equilibrium value of $\lambda = \overline{\lambda} \geqslant 1$, and for all $p > \tilde{p}$, the equilibrium value of $\lambda = 1$. $\lambda^*$ is strictly decreasing in $p$, and thus $\overline{\lambda}$ is weakly decreasing in $p$. $\tilde{p}$ is interior to the unit interval for sufficiently small values of $\kappa$.

*Proofs*. To construct this proof, first consider the threshold defined in Lemma 2: for $\overline{\alpha} \geqslant \frac{1}{p}[(1+p)\underline{\alpha} + 1 - 2\sqrt{y}]$ the equilibrium value of $\lambda = 1$. Notice that, for $\underline{\alpha} < \overline{\alpha}$, this threshold must be satisfied if $2\sqrt{y} > \underline{\alpha} + 1$. $\frac{\partial}{\partial p}\frac{1}{p}[(1+p)\underline{\alpha} + 1 - 2\sqrt{y}] = \frac{1}{p^2}[2\sqrt{y} - (\underline{\alpha} + 1)] < 0$ whenever $\overline{\alpha} < \frac{1}{p}[(1+p)\underline{\alpha} + 1 - 2\sqrt{y}]$. Thus, the range of values such that $\overline{\alpha} > \hat{\alpha}$ is weakly rising in $p$.

We begin this proof by demonstrating that $E[u_L(w, r, \lambda = 1)]$ is increasing and convex in $p$. We then demonstrate that $E[u_L(w, r, \lambda = \lambda^*)]$ may be either monotonically increasing and (weakly) concave or may be nonmonotonic (first decreasing then increasing) and convex in $p$. In the latter instance, we demonstrate that $\frac{\partial E[u_L(w,r,\lambda=\lambda^*)]}{\partial p} < \frac{\partial E[u_L(r,w,\lambda=1)]}{\partial p}$ for all values $p$.

First, we demonstrate that $E[u_L(r, w, \lambda = 1)]$ is increasing and convex in $p$:

$$\frac{\partial E[u_L(r, w, \lambda = 1)]}{\partial p} = [1 + \underline{\alpha}[1 + p(\gamma - 1)]](\gamma - 1)\underline{\alpha} > 0$$

$$\frac{\partial^2 E[u_L(r, w, \lambda = 1)]}{\partial p^2} = (\gamma - 1)^2\underline{\alpha}^2 > 0$$

Now consider $E[u_L(r, w, \lambda = \lambda^*)]$. When $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$:

$$\frac{\partial E[u_L(r, w, \lambda = \lambda^*)]}{\partial p} = (\gamma - 1)\underline{\alpha}\left[\frac{1}{2} - \left(\frac{\gamma^2\underline{\alpha}^2}{2} - \kappa\right)\lambda^*\right]$$

$$\frac{\partial^2 E[u_L(r, w, \lambda = \lambda^*)]}{\partial p^2} = -(\gamma - 1)\underline{\alpha}\left(\frac{\gamma^2\underline{\alpha}^2}{2} - \kappa\right)\frac{\partial\lambda^*}{\partial p}$$

$\kappa \geqslant \frac{\gamma^2\underline{\alpha}^2}{2}$ ensures that $\frac{\partial E[u_L(r,w,\lambda=\lambda^*)]}{\partial p} > 0$. $\frac{\partial\lambda^*}{\partial p} \leqslant 0$ implying that, in this case, $\frac{\partial^2 E[u_L(r,w,\lambda=\lambda^*)]}{\partial p^2} \leqslant 0$.

If $\kappa < \frac{\gamma^2\underline{\alpha}^2}{2}$:

$$\frac{\partial E[u_L(r, w, \lambda = \lambda^*)]}{\partial p} < \frac{1}{2}(\gamma - 1)\underline{\alpha}$$

$$\frac{1}{2}(\gamma - 1)\underline{\alpha} < \frac{\partial E[u_L(r, w, \lambda = 1)]}{\partial p} = [1 + \underline{\alpha}[1 + p(\gamma - 1)]](\gamma - 1)\underline{\alpha}$$

$$\Leftrightarrow \frac{\partial E[u_L(r, w, \lambda = \overline{\lambda})]}{\partial p} < \frac{\partial E[u_L(r, w, \lambda = 1)]}{\partial p}$$

Finally, when $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} < \underline{\alpha}$, $E[u_L(r, w, \lambda = \lambda^*)] = 2\overline{\alpha} + (1 - \lambda^*)\kappa$. $\lambda^*$ is decreasing and convex in $p$, implying that this function is increasing and concave in $p$.

These conditions are sufficient to ensure that, if $\lim_{p\to 0} E[u_L(r, w, \lambda = \lambda^*)] > \lim_{p\to 0} E[u_L(r, w, \lambda = 1)]$ and $\lim_{p\to 1} E[u_L(r, w, \lambda = \lambda^*)] < \lim_{p\to 1} E[u_L(r, w, \lambda = 1)]$, the intersection between these two functions is unique.

First, consider the situation as $p \to 1$:

$$\lim_{p\to 1} E[u_L(r, w, \lambda = 1)] = \lim_{p\to 1} \frac{[1 + \underline{\alpha}[1 + p(\gamma - 1)]]^2}{2}$$
$$= \frac{[1 + \gamma\underline{\alpha}]^2}{2}$$

Notice that $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} < \underline{\alpha}$ can never be satisfied under Assumption 1 when $p \to 1$. Thus, we need only consider $E[u_L(r, w, \lambda = \lambda^*)]$ when $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} \geqslant \underline{\alpha}$:

$$\lim_{p\to 1} E[u_L(r, w, \lambda = \lambda^*)] = \lim_{p\to 1} \frac{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}}{2} + \gamma\underline{\alpha} + \kappa + \left(\frac{\gamma^2\underline{\alpha}^2}{2} - \kappa\right)\frac{1}{2\sqrt{y} - \underline{\alpha} - (1-\gamma)p\underline{\alpha}}$$
$$= \frac{1}{2}[\lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}}]^2 + (1-\lambda^*)\kappa$$

$$\frac{1}{2}\left[\lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}}\right]^2 + (1-\lambda^*)\kappa \leqslant \frac{1}{2}\left[\lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}}\right]^2$$
$$\frac{1}{2}\left[\lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}}\right]^2 \leqslant \frac{[1+\gamma\underline{\alpha}]^2}{2}$$
$$\Leftrightarrow \lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}} < 1 + \gamma\underline{\alpha}$$

Given than $\lambda^* \geqslant 1$, we demonstrate that:

$$\frac{\partial}{\partial\lambda^*}\lambda^{*-\frac{1}{2}} + \gamma\underline{\alpha}\lambda^{*\frac{1}{2}} < 0$$
$$\Leftrightarrow \underline{\alpha} < \sqrt{y}$$

which must be true by Assumption 1. Thus, the conditions in Proposition 1 never hold as $p \to 1$.

Notice that, if $\overline{\lambda} = 1$ as $p \to 0$, then $2\sqrt{y} > 1 + \underline{\alpha}$, implying that the threshold defined in Lemma 2 always binds and the equilibrium value of $\lambda = 1$ for all other parameter values. We now consider the conditions under which this threshold does not always bind.

As $p \to 0$, we have:

$$\lim_{p\to 0} E[u_L(r, w, \lambda = 1)] = \lim_{p\to 0} \frac{[1 + \underline{\alpha}[1 + p(\gamma - 1)]]^2}{2}$$
$$= \frac{[1 + \underline{\alpha}]^2}{2}$$

If $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} > \underline{\alpha}$, we have:

$$\lim_{p\to 0} E[u_L(r,w,\lambda=\lambda^*)] = \lim_{p\to 0}\frac{2\sqrt{y}-\underline{\alpha}-(1-\gamma)p\underline{\alpha}}{2}+\gamma\underline{\alpha}+\kappa + \left(\frac{\gamma^2\underline{\alpha}^2}{2}-\kappa\right)\frac{1}{2\sqrt{y}-\underline{\alpha}-(1-\gamma)p\underline{\alpha}}$$
$$=\frac{1}{2}\left[\lambda^{*-\frac{1}{2}}+\gamma\underline{\alpha}\lambda^{*\frac{1}{2}}\right]^2+(1-\lambda^*)\kappa$$

For $\lambda^* > 1$ this expression is strictly decreasing and continuous in $\kappa$. We can thus be guaranteed that there exists some value of $\kappa$ which we define as $\tilde{\kappa}$ such $\lim_{p\to 0} E[u_L(r,w,\lambda=\lambda^*)] \geqslant \lim_{p\to 0} E[u_L(r,w,\lambda=1)]$ for all $\kappa \leqslant \tilde{\kappa}$ iff

$$\lambda^{*-\frac{1}{2}}+\gamma\underline{\alpha}\lambda^{*\frac{1}{2}} \geqslant 1+\underline{\alpha}$$

$$\gamma\underline{\alpha}\lambda^{*\frac{1}{2}}-1 \geqslant \underline{\alpha}-\lambda^{*-\frac{1}{2}}$$

$$\frac{\gamma\underline{\alpha}-(2\sqrt{y}-\underline{\alpha})^{\frac{1}{2}}}{(2\sqrt{y}-\underline{\alpha})^{\frac{1}{2}}} \geqslant \underline{\alpha}-(2\sqrt{y}-\underline{\alpha})^{\frac{1}{2}}$$

which must hold true for $\gamma > 1$ and $2\sqrt{y}-\underline{\alpha} < 1$.

If $\frac{2\sqrt{y}-(1-p)\overline{\alpha}}{1+p} < \underline{\alpha}$, we have:

$$\lim_{p\to 0} E[u_L(r,w,\lambda=\lambda^*)] = 2\overline{\alpha}+(1-\lambda^*)\kappa$$

$2 > \frac{[1+\underline{\alpha}]^2}{2}$, implying that there must exist a value $\tilde{\kappa} > 0$ such that $\lim_{p\to 0} E[u_L(r,w,\lambda=\lambda^*)] > \lim_{p\to 0} E[u_L(r,w,\lambda=1)]$ when $\kappa \leqslant \tilde{\kappa}$ and this does not hold for $\kappa > \tilde{\kappa}$.

These limits imply that, for $2\sqrt{y} < 1+\underline{\alpha}$ and $\kappa < \tilde{\kappa}$, there must be some value of $p$ at which the functions $E[u_L(r,w,\lambda=\overline{\lambda})]$ and $E[u_L(r,w,\lambda=1)]$ intersect. The conditions with regard to the derivatives of these functions imply that this point is unique. □

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