The Loyalty-Efficiency Tradeoff in Authoritarian Repression

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Abstract

Although some dictators construct coup-proofed and personally loyal militaries, others favor professional militaries that can more efficiently defeat outsider threats. Existing research analyzes the purportedly ubiquitous "loyalty-efficiency" tradeoff that dictators face and the "guardianship dilemma" that strong outsider threats create. This paper shows these two tradeoffs are intimately related by studying the *orientation* and *strength* of outsider threats. In the formal model, a dictator chooses between a personalist and professional military. The military can repress to defend the dictator, stage a coup, or transition to outsider rule. Non-revolutionary threats do not generate a loyalty-efficiency tradeoff. Personalist militaries' lower reservation value under outsider rule yields considerably stronger incentives than professional militaries to repress non-revolutionary threats—and, consequently, higher equilibrium repressive efficiency. The dictator's strict preference for the personalist military also eliminates the guardianship dilemma. However, a strong revolutionary threat triggers both tradeoffs and encourages choosing a professional military despite raising coup likelihood.

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1 INTRODUCTION

Non-democratic rulers pursue diverse strategies to survive in power. Many contemporary dictators oversee a formal party, compete in elections, and make concessions to the opposition by accepting constraints imposed by legislatures and written constitutions. Yet although most recent research on authoritarian politics analyzes the effects of quasi-democratic institutions on authoritarian regime survival (Gandhi 2008; Geddes et al. 2018; Meng 2019), the military provides the survival tool of last resort for any dictator. Authoritarian rulers engage in low-intensity repressive techniques to prevent mass citizen mobilization from occurring in the first place as well as attempt to deter rebel organization and foreign invasions. However, when facing a perilous threat, the regime will survive only if the military successfully disbands protesters and fights effectively to defeat domestic or foreign armed groups. Mass uprisings, rebel victory in civil war, and foreign invasions collectively accounted for 29% percent of authoritarian regime collapses between 1945 and 2010 (Geddes et al. 2018, 179).

How do dictators construct a military apparatus to enhance regime survival? Many argue that dictators face a ***loyalty-efficiency*** tradeoff. Finer's (1975, 93-5; 1997, 17-9) wide-ranging survey of historical forms of military organization discusses the loyalty-efficiency tradeoff in early modern Europe by contrasting efficient foreign mercenary troops with more loyal paid domestic troops. Focusing on contemporary polities, Powell (2014, 2) argues that leaders "find themselves mired in a paradox in which a weak military can leave them vulnerable to invasion or civil war, while a strong military could expedite their exit through a coup d'etat." Similarly, Greitens (2016, 4) proclaims: "Because coup-proofing calls for fragmented and socially exclusive organizations, while protecting against popular unrest demands unitary and exclusive ones, autocrats cannot simultaneously maximize their defenses against both threats." To fix ideas, it is useful to distinguish between (1) professional militaries that recruit officers and soldiers from broad strata of society into an apparatus distinguished by meritocratic promotion and a disciplined hierarchical command, and (2) personalist militaries that stack the officer corps with unqualified family members and co-ethnics.

Confronting the loyalty-efficiency tradeoff, the more immediate threat of insider overthrow via a coup causes many dictators to create "coup-proofed" personalist militaries despite considerable evidence that protecting against disloyalty diminishes military efficiency (Quinlivan 1999; Pilster and Böhmelt 2011; Talmadge 2015). Roessler (2016) characterizes a similar tradeoff whereby fear of a coup may cause a ruler to exclude rival ethnic groups from power, which hinders the state's counterinsurgency capacity by disrupting the government's intelligence network in the excluded group's regional base. Empirically, coups accounted for 35% of authoritarian regime collapses between 1945 and 2010 (Geddes et al. 2018, 179). Yet when a dictator faces a particularly strong outsider threat, it willingly sacrifices coup loyalty for increased repressive efficiency (Acemoglu et al. 2010; Besley and Robinson 2010; Svolik 2013). This is known as the ***guardianship dilemma*** because the stronger guards needed to defeat a severe threat can more easily overthrow the dictator via a coup.[1]

Existing theories overlook two crucial considerations. First, most arguments positing a loyalty-efficiency tradeoff do not address the military's strategic decision regarding whether or not to exercise repression when given orders. For example, whereas largely professional militaries in Tunisia and Egypt were ultimately unwilling to repress pro-democracy protesters in early 2011 amid the Arab Spring uprisings, personalist militaries in Bahrain, Syria, and (at least in part) Libya reacted with harsh crackdowns. Many democratic transitions in Latin America in the 1980s occurred when professionally oriented militaries negotiated deals with broad societal groups (e.g., Uruguay) or with moderate rebel groups (e.g., El Salvador). Despite the greater coercive capacity of professional militaries, this latent capacity only translates into high repressive efficiency if top-ranking officers exert effort to defend the regime.

Although other recent non-formal and formal contributions address this agency problem,[2] a second oversight across existing research is that outsider threats vary in their goals—which in turn affects the military's incentives to exercise repression. In the aforementioned examples of Egypt, Tunisia, Uruguay, and El Salvador, the opposition did not seek to fundamentally reconstruct the social order, and this *non-revolutionary* orientation likely influenced the professional militaries' decisions to cut a deal. However, generals in these

[1]McMahon and Slantchev's (2015) provide an important critique of the guardianship dilemma logic, which I discuss below.

[2]McLauchlin (2010), Bellin (2012), and Barany (2016) present case studies of militaries' repression decisions, and an older literature addresses the frequency with which states experienced military intervention in politics following independence from European colonial rule. Myerson (2008), Tyson (2018), Dragu and Lupu (2018), and Dragu and Przeworski (2019) formally analyze various aspects of the dictator's agency problem (focusing on coordination problems), and other recent formal models study additional strategic aspects of authoritarian repression (Pierskalla 2010; Ritter 2014; Gibilisco 2017).

militaries may have chosen differently if they faced a more *revolutionary*-oriented threat that likely would have led to a worse post-exit fate for military leaders. Additionally, narrow ethnically stacked militaries such as those in Bahrain and Syria usually fear rule by any other group. How attributes of outsider threats (such as their strength and orientation) affect the incentives of different types of militaries to exercise repression is a critical but understudied aspect of understanding how dictators strategically construct their militaries.

This paper analyzes a formal model that studies the core strategic tradeoffs that dictators face when constructing their military apparatus, and the consequences of dictators' choices for regime survival. The dictator—who faces an exogenous outsider threat that can overthrow the regime—chooses how to organize its coercive apparatus by delegating authority to either a personalist or a professional military. The dictator faces a dual agency problem. To survive, it needs the military to defend the regime by exercising repression, but the military can alternatively decide to either negotiate a transition with the outsider or attempt a coup. Compared to a personalist military, a professional military is more likely to be *able* to successfully repress the opposition. However, because professional militaries recruit from broad segments of society, and merit rather than personal fealty to the incumbent dictator determines promotion decisions, professional militaries fare better than personalist militaries if they negotiate a transition to outsider rule. Professional militaries are also more likely to have an opportunity to successfully stage a coup.

The main findings from the model rethink the logic of the loyalty-efficiency tradeoff and the guardianship dilemma. First, I open up key implicit assumptions undergirding the loyalty-efficiency tradeoff by modeling endogenous repression compliance and by allowing the outsider threat to vary in its revolutionary orientation. Facing a non-revolutionary threat, stacking the military with sycophants can reduce the probability of outsider overthrow—that is, *raise* repressive efficiency—relative to a more professional military. Whereas professional militaries fare relatively well under rule by a non-revolutionary outsider, personalist militaries do not because of their patrimonial ties to the incumbent. This discrepancy causes personalist militaries to repress on behalf of the incumbent with greater likelihood, yielding a lower probability of outsider takeover despite the personalist military's lower endowed coercive ability. Therefore, if encountering a non-revolutionary threat, the dictator *does not* trade off between loyalty and efficiency: the personalist military exhibits higher repressive efficiency and higher loyalty (in the sense of lower coup propensity).[3]

Instead, dictators only face a loyalty-efficiency tradeoff when encountering strong *revolutionary* threats,

[3] The latter result is true for all parameter values.

such as communist guerrillas in Malaysia in the 1960s and anti-monarchical rebellions in the Middle East in the 1950s and 1960s. These threats pose an existential crisis regardless of whether the military is personalist or professional—because the outsider seeks to upend the existing social structure and elites—which incentivizes either type of military to defend the regime. The professional military's greater coercive endowment causes it to defeat the threat with higher probability than the personalist military, and stronger outsider threats increase this discrepancy. Therefore, if the threat is large in magnitude and oriented toward revolution, the dictator chooses a professional military to maximize efficiency—despite its higher coup propensity.

The second main result shows that the dictator faces a guardianship dilemma if and only if it faces a loyalty-efficiency tradeoff. If the threat is revolutionary, then the dictator's willingness to sacrifice coup loyalty for higher repressive efficiency as the outsider threat grows in strength creates a non-monotonic relationship between threat size and equilibrium coup probability. The coup probability exhibits a discrete increase at an intermediate threat level in which the dictator switches from a personalist to a professional military—recovering the traditional guardianship dilemma logic. However, at all other threat levels, the equilibrium probability of a coup *decreases* in outsider threat strength because the dictator does not change its choice of military and the stronger outsider threat increases the difficulty of installing a military dictatorship.

By contrast, a non-revolutionary threat eliminates the guardianship dilemma for the same reason that it obviates the loyalty-efficiency tradeoff. In this case, the personalist military is more repressively efficient regardless of threat strength. This implies that increasing the severity of a non-revolutionary threat does not cause the dictator to switch to the less loyal professional military. Therefore, equilibrium coup likelihood strictly decreases in the size of the threat. Figure 1 summarizes the main theoretical findings.

Table 1: Summary of Main Findings

Non-revolutionary threat	Revolutionary threat
(Professional military has high value to outsider rule)	(Professional military has low value to outsider rule)
⇓	⇓
Personalist military more repressively efficient regardless of threat size	Personalist more efficient if weak threat Professional more efficient if strong threat
⇓	⇓
No loyalty-efficiency tradeoff	Loyalty-efficiency tradeoff
⇓	⇓
No guardianship dilemma	Guardianship dilemma

Three additional findings contribute to other aspects of understanding authoritarian survival strategies. First, contrary to arguments that dictators choose broad-based militaries if the dominant perceived threat when coming to power is an outsider rebellion (Greitens 2016), the revised loyalty-efficiency logic here explains why dictators facing a low coup threat may still choose a personalist military. Second, extending the model enables conceptualizing and studying the effects of "inherent loyalty" and "strategic loyalty." Third, another extension explains a new way that unpopular dictators can gamble for resurrection. Provoking revolutionary opposition leaders raises the likelihood that the military will step in to save the regime, although lowers the dictator's payoff under outsider rule. The conclusion discusses empirical implications.

Relative to the existing literature, I depart from existing studies of the loyalty-efficiency tradeoff by establishing the *conditions* under which a loyalty-efficiency tradeoff exists, rather than assuming dictators necessarily trade off between loyalty and efficiency. It also departs from two existing formal theoretic models that analyze how dictators choose between competent and incompetent agents. Zakharov (2016) characterizes a dynamic loyalty-efficiency tradeoff between high-quality advisers that generate a high fixed payoff for the dictator, and low-quality advisers that endogenously demonstrate higher loyalty to the incumbent dictator because they have a lower outside option to betraying the incumbent than high-quality advisers. This resembles the present idea that professional militaries have a higher reservation value to negotiating a transition with society. However, in my model, the dictator's utility depends on whether the military *chooses* to exert repressive effort, contrary to Zakharov's (2016) assumption that dictators accrue a *fixed* rent from particular types of agents. Therefore, in his model, rulers always face a loyalty-efficiency tradeoff. By contrast, here, despite a weaker coercive endowment, a personalist military may exhibit greater repressive efficiency than a professional military. This discrepancy is crucial for explaining the conditions under which a dictator faces a loyalty-efficiency tradeoff and, consequently, a guardianship dilemma. My model also departs from Egorov and Sonin (2011), in which rulers always face a loyalty-efficiency tradeoff because of different informational endowments. In their model, agents do not differ in their coercive ability to defend the regime.

The findings also depart from existing theories of the guardianship dilemma by showing the intimate relationship with the loyalty-efficiency tradeoff. The analysis follows McMahon and Slantchev (2015) by critiquing the guardianship logic, although the present critique is more fundamental. I adopt their core assumption that the outsider threat endogenously affects the military's incentives to stage a coup,[4] but this

[4] By contrast, earlier models implicitly assume that the outsider threat disappears if the military takes over.

is insufficient to eliminate the guardianship mechanism. Despite this assumption, if the outsider threat is revolutionary, then a large-enough increase in the magnitude of the threat causes the dictator to switch from a personalist to a professional military. This raises the equilibrium probability of a coup attempt—which is the guardianship mechanism. Instead, only a *non*-revolutionary threat eliminates the guardianship dilemma because it obviates the loyalty-efficiency tradeoff. This insight follows from the novel aspects of my model: allowing the military the option of negotiating a transition with the outsider, and parameterizing the orientation of the outsider threat.[5]

The present focus on how militaries expect to fare following societal transition instead relates to broader considerations in the political regimes literature. Geddes (1999) argues that military regimes often acquiesce to democratization because the military will survive as an intact organization. Debs (2016) proposes a different mechanism based on expected post-transition fate: military dictators are more willing than other types of dictators to democratize because they are less likely to face punishment for their comparative advantage in coercion under a democratic than an authoritarian regime. More broadly, Albertus and Menaldo (2018) argue that dictators more willingly democratize after enacting a constitution that affords elite protection against political participation by the masses.

2 Setup of Baseline Model

Section 2.1 presents the sequence of moves in the baseline game, Section 2.2 discusses key assumptions, and Section 2.3 highlights several simplifying assumptions relaxed in various subsequent extensions.

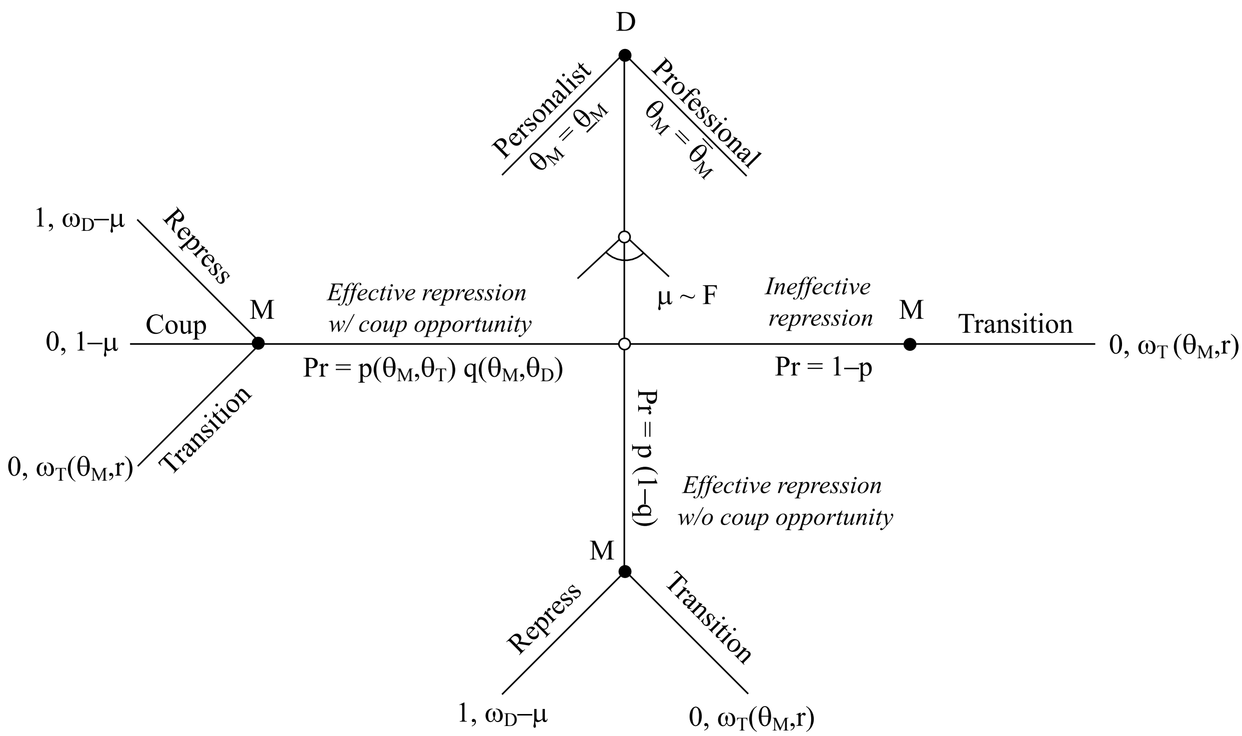
2.1 Players, Choices, and Payoffs

Two strategic players that face an exogenous outsider threat make sequential choices, as Figure 1 shows. The dictator chooses between a personalist military with low coercive capacity $\theta_M = \underline{\theta}_M > 0$ and a high-capacity professional military with $\theta_M = \overline{\theta}_M > \underline{\theta}_M$. The dictator's only goal is political survival: it consumes 1 if it survives in power, and 0 otherwise. As described below, there is one path for the dictator to survive in power—the military exercises repression without staging a coup—whereas either a coup or the

[5]McMahon and Slantchev (2015) instead assume that the military consumes 0 if the outsider takes over, which corresponds to the ideal-type revolutionary threat in my model. Consequently, even if given the choice, the military would never initiate a transition in their model.

military transitioning to outsider rule causes the dictator to lose power. To focus only on elements needed to generate the core tradeoffs, the dictator does not pay costs of repression or of military-building.

Figure 1: Game Tree for Baseline Model



Several Nature moves occur in between the dictator's and military's decision nodes—that is, the military observes the draws whereas the dictator only knows their prior distribution—that determine the military's choice set. The Nature draws reflect inherent variability in (1) outsiders' ability to threaten the regime, (2) costs of exercising repression, and (3) chances for the military to successfully overthrow the ruler via a coup. First, the military is effective at repression with probability $p(\theta_M, \theta_T) \in (0,1)$, with $\theta_T \in \left(0, \overline{\theta}_T\right)$ capturing the coercive capacity of the outsider threat, and $\overline{\theta}_T > 0$. Second, conditional on the possibility of repressing effectively, the cost of exercising repression equals μ, drawn from a smooth cdf $F(\cdot)$ with full support over $\left[0, \overline{\mu}\right]$, for $\overline{\mu}$ defined later. The associated pdf is denoted as $f(\cdot)$.[6] Third, conditional on effective repression, the probability that the military has an opportunity to stage a coup equals $q(\theta_M, \theta_D) \in (0,1)$, with $\theta_D \in \left(0, \overline{\theta}_D\right)$ expressing the capacity of the dictator to resist a coup attempt, and $\overline{\theta}_D > 0$. Below I discuss the key assumptions about how each input affects the probability terms.

[6]Several proofs require the additional assumption $f'(\cdot) \leq 0$ which, for example, the uniform distribution satisfies.

The military makes the final strategic move and chooses from up to three possibilities. First, if the military is effective at repression and exercises this option, then it successfully defends the regime with probability 1 and consumes $\omega_D - \mu$. For either type of military, consumption under the status quo regime equals $\omega_D \in (0, 1)$. The military exercising repression is the only scenario in which the incumbent dictator survives and consumes 1. Second, if the military stages a coup (which requires effective repression and a coup opportunity), the attempt succeeds with probability 1 and the military consumes $1 - \mu$. This implies that the military derives more utility from a military dictatorship than the incumbent authoritarian regime. Third, the military's utility to negotiating a transition to outsider rule equals $\omega_T(\theta_M, r)$, and the assumptions discussed below imply $\omega_T \leq \omega_D$. The orientation of the outsider threat is parameterized by $r \in (0, 1)$,[7] and higher r corresponds to a more revolutionary threat. If the military either stages a coup or transitions to outsider rule, the dictator loses power and consumes 0. Appendix Table A.1 summarizes the formal notation.

2.2 Key Assumptions

Rulers throughout history have organized their militaries in various manners (Huntington 1957; Finer 1975, 1997, 2002). The present distinction between personalist and professional militaries captures several key differences across militaries in a parsimonious manner: fighting and repression capacity, opportunities for staging coups, and prospects under outsider rule.

2.2.1 Probability of Effective Repression

The first distinction in the model between types of militaries is that professional militaries exhibit greater ability to fight and repress than personalist militaries. Professional militaries' hierarchical chain of command minimizes the probability of splits and defections, which increases their ability to defeat insurgents or disperse protesters. By contrast, personalist militaries feature more extensive coup-proofing measures—such as preventing officers from communicating with each other and diverting resources to paramilitary organizations such as presidential guards—which undermines their fighting capacity (Quinlivan 1999; Pilster and Böhmelt 2011; Talmadge 2015). We can also conceive of professional militaries as those that recruit from broad segments of society, as opposed to personalist militaries that recruit more narrowly. The government needs people to fight, and recruiting solely from one group can create manpower deficits (Quinlivan 1999).

[7] The normalized bounds are without loss of generality.

Ethnically biased recruitment can also undermine intelligence networks in areas populated by excluded ethnic groups, which hinders counterinsurgency capabilities (Roessler 2016).

The Nature move that determines whether or not the military can effectively repress captures inherent variability in outsiders' ability to threaten the regime. Lacking a repressive opportunity corresponds to various possible circumstances: killing enough people to end a rebellion would be prohibitively costly, such as Indonesia in 1999 prior to democratizing; lower-level officers refuse to follow orders or mutiny, such as Iran in 1978-79; or in which prior battles cause the military to large disintegrate, such as Ethiopia in 1991 at the conclusion of the civil war that ended the Mengistu regime. Similarly, even if the military can effectively repress, the exact costs of repressing also depend on factors related to the extent of societal mobilization that are outside the regime's direct control, justifying the assumed variability in μ.

The function that determines the probability that repression will be effective satisfies several intuitive properties, which Figure 2 depicts by plotting $p(\theta_M, \theta_T)$ as a function of θ_T, fixing other parameter values, and assuming congruous functional forms. Either type of military for sure defeats the weakest possible threat: $p(\theta_M, 0) = 1$ for all $\theta_M > 0$. Assuming $\frac{\partial p}{\partial \theta_M} > 0$ implies that for all $\theta_T > 0$, the professional military has a higher probability of effective repression. This probability decreases in the magnitude of the outsider threat, $\frac{\partial p}{\partial \theta_T} < 0$,[8] with increasing differences, $\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} > 0$. The cross-partial captures the intuitive idea that the coercive advantages of professional militaries are more pronounced when facing stronger threats.[9]

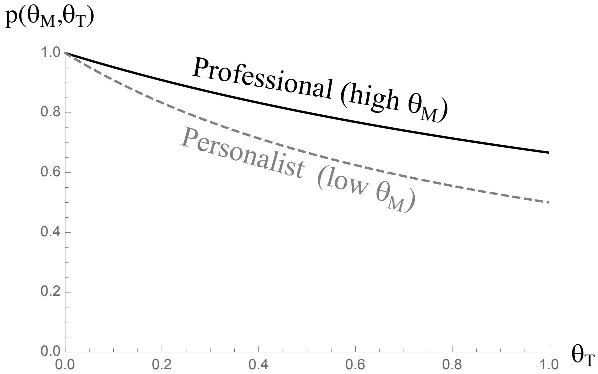
2.2.2 Probability of a Coup Opportunity

Even an aggrieved military may lack the opportunity to seize power because of the inherent secrecy and stealth involved with planning and executing a coup (Finer 2002; Luttwak 2016). Although militaries possess the guns, dictators retain non-coercive sources for thwarting coups such as mobilizing citizens to protest a coup attempt and non-domestic sources of support from allied states, which correspond with higher θ_D.

[8]This implies $p(\theta_M, \theta_T) \in (0, 1)$ for all $\theta_T > 0$.

[9]For example, the ratio-form contest function $p(\theta_M, \theta_T) = \frac{\theta_M}{\theta_M + \theta_T}$ satisfies these assumptions, including the complementarity assumption for any $\theta_M > \theta_T > 0$. Assuming $\overline{\theta}_T < \underline{\theta}_M$ incorporates the reasonable premise that the government's military has a greater coercive endowment than the outsider threat. The linear contest function $p(\theta_M, \theta_T) = 1 - \theta_T \cdot (1 - \theta_M)$ satisfies these assumptions for all $(\theta_M, \theta_T) \in [0, 1]^2$, that is, does not require assuming $\overline{\theta}_T < \underline{\theta}_M$.

Figure 2: Assumptions about Repression Effectiveness



Probability of effective repression

	Low θ_T	High θ_T
Professional military	High	Medium
Personalist military	High	Low

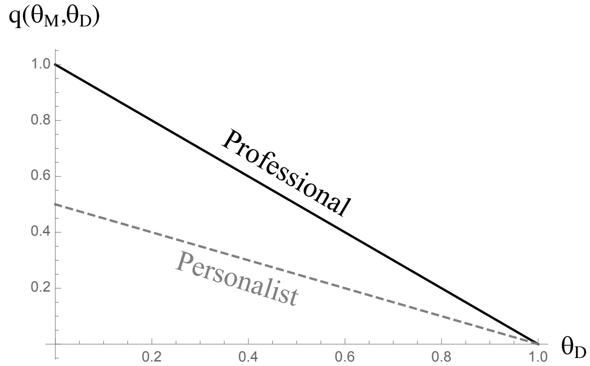
Notes: Figure 2 uses the parameter values $\overline{\theta}_T = 1$, $\underline{\theta}_M = 1$, and $\overline{\theta}_M = 2$, and assumes $p(\theta_M, \theta_T) = \frac{\theta_M}{\theta_M + \theta_T}$.

The type of military also creates variance in the opportunity to stage a coup, providing another distinction in the model between professional and personalist militaries. Measures that hinder fighting capacity, such as hindering communication among officers and building a presidential guard, are specifically designed to guard against coups. This consideration also follows the standard assumption in the guardianship dilemma literature that more capable militaries are better-situated to stage a coup (Acemoglu et al. 2010; Besley and Robinson 2010; Svolik 2013; McMahon and Slantchev 2015).

Figure 3 illustrates the core assumptions about coup opportunities that follow from these premises by plotting $q(\theta_M, \theta_D)$ as a function of θ_D. If the dictator has the highest possible popularity endowment, then neither type of military can launch a coup: $q\big(\theta_M, \overline{\theta}_D\big) = 0$ for all $\theta_M > 0$. Assuming $\frac{\partial q}{\partial \theta_M} > 0$ implies that for all $\theta_D < \overline{\theta}_D$, the professional military has a higher probability of a coup opportunity. The probability of a coup opportunity increases as the dictator's coup-proofing ability decreases, $-\frac{\partial q}{\partial \theta_D} > 0$, with increasing differences, $-\frac{\partial^2 q}{\partial \theta_D \partial \theta_M} > 0$. The cross-partial captures the intuitive idea that the coup advantages of professional militaries are more pronounced when facing a less popular dictator. I assume this cross-partial is large in magnitude (see Appendix Assumption A.1), and I impose boundary conditions such that if the dictator has the lowest coup-proofing ability, then it cannot prevent a coup attempt by the professional military: $q\big(\overline{\theta}_M, 0\big) = 1$.[10] Intuitively, whereas weak institutions and low societal support ($\theta_D = 0$) should completely incapacitate an ideal-type unpopular dictator from preventing a coup by a professional military, built-in coup-proofing measures facilitates possibly preventing a coup by a personalist military.

[10]The negative cross-partial additionally implies $q\big(\underline{\theta}_M, 0\big) < 1$.

Figure 3: Assumptions about Coup Opportunity



Probability of coup opportunity

	Low θ_D	High θ_D
Professional military	High	Low
Personalist military	Medium	Low

Notes: Figure 3 uses the parameter values $\underline{\theta}_M = 1$ and $\overline{\theta}_M = 2$, and assumes $q(\theta_M, \theta_D) = \big(\theta_M / \overline{\theta}_M\big) \cdot (1 - \theta_D)$.

2.2.3 Military's Payoff Under Outsider Rule

The military's fate under outsider rule depends on (1) the orientation of the outsider threat and (2) the type of military. First, a revolutionary threat corresponds to an outsider that seeks to transform the composition of the elite class, and perhaps the entire social structure.[11] Many revolutionary takeovers involve arbitrary arrests and executions, as with the formation of the Soviet Union, or general chaos and destruction even in cases that lack a distinctive revolutionary ideology, as with Genghis Khan in the thirteenth century. Many twentieth-century communist movements fit the revolutionary characterization. For example, the Chinese Communist party implemented a massive land reform during and after its struggle to capture power in 1949. This was necessary to "destroy the gentry-landlord class (and thus eliminate a potential counterrevolutionary threat), establish Communist political power within the villages, and thus promote the building of a centralized state with firm administrative control over the countryside" (Meisner 1999, 92). Levitsky and Way (2013, 7) discuss the broad goals of revolutionaries to destroy traditional ruling and religious institutions, political parties, and the old army: "In most revolutions, preexisting armies either dissolved with the fall of the dictator (Cuba and Nicaragua) or were destroyed by civil war (China, Mexico, and Russia)."

Of course, dictators face multiple threats and the nature of these threats can change over time. We can conceive θ_T and r as a weighted average of the outsider threats that the dictator anticipates when shaping its military, for which the most important decisions often occur at the beginning of the ruler's tenure. This

[11]I therefore adopt a narrower definition of revolutionary aims than scholars such as Barany (2016, 7), who label any bottom-up mass popular challenge as a revolution.

resembles Greitens's (2016) focus on the main threat a dictator faces when achieving power.

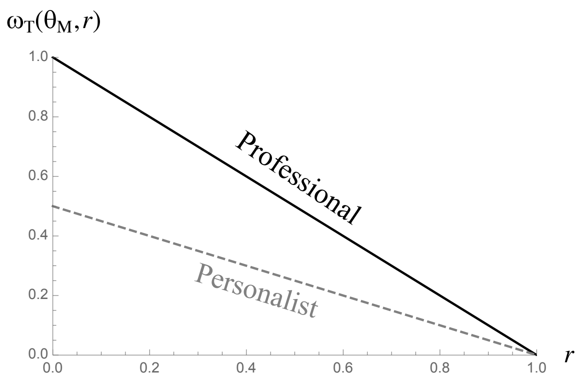
The second consideration about the military's fate under outsider rule highlights another important difference among types of militaries: professional militaries are recruited from broader strata of society, yielding better fates than personalist militaries under outsider rule. Although this discrepancy in exit options is muted when facing a revolutionary threat because both types of militaries face existential crises, non-revolutionary outsiders create divergent payoffs. A professional military expects minimal restructuring because it will remain largely intact in a non-revolutionary regime, but a personalist military composed largely of soldiers tied to the previous regime expects extensive purging. For example, amid pro-democracy protests that emerged across Arab countries in early 2011, the more professional Egyptian army eventually acquiesced to regime transition but the ethnically stacked and personalist army in Syria takeover by non-Alawites. The Syrian military's willingness to fight outsiders triggered a civil war still ongoing as of 2019. Although members of the al-Asad regime may consider the Sunni opposition as "revolutionary," in cases such as this, a professional military would likely consider the protesters' and rebels' espoused democratization goals as non-revolutionary—implying that disparities in repression incentives arise from differences between personalist and professional regimes rather than from the outsider's orientation. Beyond the Middle East, most of Geddes's (1999) examples of military dictatorships acquiescing to democratization are in Latin America in the 1980s, which tended to feature professional militaries facing non-revolutionary threats.

These considerations motivate the following assumptions about the military's payoff under outsider rule, which Figure 4 depicts by plotting $\omega_T\big(\theta_M, r\big)$ as a function of r. Both military types expect dire fates under an ideal-type revolutionary threat ($r = 1$) because both expect executions, disbandment, and other punishments: $\omega_T\big(\theta_M, 1\big) = 0$ for all $\theta_M > 0$. For any $r < 1$, the professional military fares better than the personalist military under outsider rule, which follows from assuming $\frac{\partial \omega_T}{\partial \theta_M} > 0$. A decrease in the revolutionary nature of the outsider increases the payoff for either type of military under outsider rule, $-\frac{\partial \omega_T}{\partial r} > 0$, with increasing differences, $-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} > 0$. The cross-partial captures the intuitive idea, discussed above, that professional militaries fare considerably better than personalist militaries under rule by a non-revolutionary outsider. I also assume that the cross-partial is large in magnitude (see Appendix Assumption A.1), and impose a boundary condition: for the least revolutionary type of threat ($r = 0$), the professional military consumes the same as under the status quo authoritarian regime, $\omega_T\big(\overline{\theta}_M, 0\big) = \omega_D$.[12] Imposing

[12] The negative cross-partial additionally implies $\omega_T\big(\underline{\theta}_M, 0\big) < \omega_D$.

assumptions such that $\omega_T < \omega_D$ for all $r \in (0, 1)$ focuses the analysis on the non-trivial case in which any military receives certain perks under the incumbent regime that it would lose following a transition.

Figure 4: Assumptions about Military's Payoff Under Outsider Rule



Payoff to outsider rule

	Low r	High r
Professional military	High	Low
Personalist military	Medium	Low

Notes: Figure 4 uses the parameter values $\underline{\theta}_M = 1$, $\overline{\theta}_M = 2$, $\omega_D = 0.5$, and assumes $\omega_T(\theta_M, r) = \left(\theta_M / \overline{\theta}_M\right) \cdot (1 - r) \cdot \omega_D$.

2.3 Simplifying Assumptions and Extensions

The model contains four key elements that existing models treat separately: the dictator chooses its type of military; and the military chooses among repressing, staging a coup, and transitioning to outsider rule. The military's coercive endowment θ_M affects all three of its choices. Although including all these elements in the model is necessary to address the motivating questions regarding the loyalty-efficiency tradeoff, they impose tractability constraints. Despite the otherwise parsimonious setup, θ_M enters the dictator's objective function in three places (see Equation 2), which causes the number of indirect effects to proliferate in higher-order derivatives of the objective function. Numerous extensions presented later in the paper and the appendix, which Table 2 summarizes, relax numerous simplifying assumptions.

Table 2: Summary of Extensions

Assumption in baseline model	**Alteration**	**Section**
Both militaries consume ω_D in incumbent regime, which is less-preferred than military rule	Heterogeneous military valuation of incumbent regime yields differential "inherent" loyalty	5.1
Military's consumption under outsider rule does not affect its coup calculus	Possibility that a coup might yield outsider rule yields differential "strategic" loyalty	5.2
Dictator cares only about political survival	Dictator's consumption under outsider rule varies	6
Composition of outsider threat is exogenous	Dictator chooses revolutionary orientation	6
Repression success or not known at military's information set	Probabilistic repression success	B.1
Dictator's choice over military type is binary	Continuous choice over military type	B.2

3 Analysis of Military's Decision

3.1 Repression, Coup, or Transition?

Table 3: Military's Optimal Choice

	Coup opportunity Pr=$q(\theta_M, \theta_D)$	**Not** Pr=$1-q(\theta_M, \theta_D)$
Repression is effective Pr=$p(\theta_M, \theta_T)$	Coup	Repress if μ is low Transition if μ is high
Ineffective Pr=$1-p(\theta_M, \theta_T)$	Transition	Transition

Solving backwards, Table 3 shows the military's optimal choices. If repression is ineffective, then the military's only option is to transition to outsider rule. If instead repression is effective, then its optimal choice depends on the other Nature draws. If the military has a coup opportunity, then it will stage a coup. It prefers creating a military dictatorship to defending the regime because $\omega_D < 1$, and necessarily prefers a coup to a transition because I assume that the maximum possible repression cost is sufficiently low, $\overline{\mu} = 1-\omega_D$. But if the military lacks a coup opportunity, then its optimal choice depends on repression costs. If $\mu < \hat{\mu}(\theta_M) \equiv \omega_D - \omega_T(\theta_M, r)$, then the military defends the regime, whereas the military transitions if μ is higher. The critical repression-cost threshold $\hat{\mu}(\theta_M)$ depends on θ_M because this parameter affects the military's payoff under outsider rule. The assumed distributions for the Nature variables enables writing the probability of each outcome conditional on the dictator's military choice.

Lemma 1 (Outcome probabilities conditional on military type)**.** *Given θ_M, the equilibrium probability of each outcome is:*

$$\textit{Pr(repress)} = \underbrace{\Big[1 - q(\theta_M, \theta_D)\Big]}_{\textit{No coup opportunity}} \cdot \underbrace{p(\theta_M, \theta_T)}_{\textit{Effective repression}} \cdot \underbrace{F\Big(\omega_D - \omega_T(\theta_M, r)\Big)}_{\textit{Low repression costs}}$$

$$\textit{Pr(coup)} = \underbrace{q(\theta_M, \theta_D) \cdot p(\theta_M, \theta_T)}_{\textit{Effective repression and coup opportunity}}$$

$$\textit{Pr(transition)} = \underbrace{1 - p(\theta_M, \theta_T)}_{\textit{Ineffective repression}} + \Big[1 - q(\theta_M, \theta_D)\Big] \cdot p(\theta_M, \theta_T) \cdot \underbrace{\Big[1 - F\Big(\omega_D - \omega_T(\theta_M, r)\Big)\Big]}_{\textit{High repression costs}}$$

Lemma 1 yields two immediate implications. First, the personalist military is less likely to attempt a coup—indicating higher loyalty—because the professional military is more likely to have a coup opportunity. Second, conditional on effective repression and the military lacking a coup opportunity, the personalist military defends the regime with higher probability: its lower consumption under outsider rule increases the range of μ values small enough that it optimally represses.

Lemma 2 (Coup loyalty)**.**

$$\underbrace{p\big(\overline{\theta}_M,\theta_T\big)\cdot q\big(\overline{\theta}_M,\theta_D\big)}_{\textit{Professional}} > \underbrace{p\big(\underline{\theta}_M,\theta_T\big)\cdot q\big(\underline{\theta}_M,\theta_D\big)}_{\textit{Personalist}}$$

Lemma 3 (Conditional exercising repression)**.**

$$\underbrace{F\Big(\omega_D-\omega_T\big(\overline{\theta}_M,r\big)\Big)}_{\textit{Professional}} < \underbrace{F\Big(\omega_D-\omega_T\big(\underline{\theta}_M,r\big)\Big)}_{\textit{Personalist}}$$

3.2 Loyalty and Efficiency Mechanisms

These lemmas enable characterizing the relative advantages of each military type from the dictator's perspective, which Table 4 summarizes. Recovering conventional wisdom about the loyalty-efficiency tradeoff, personalist militaries exhibit higher ***loyalty*** through their lower probability of a coup (Lemma 2). Nature drawing both a coup opportunity and effective repression—both of which advantage the professional military—are necessary and sufficient for a coup. Notably, the coup loyalty result follows solely from differential *opportunities* to stage a coup rather than from differences in the military's *preferences* for the incumbent. In other words, conventional ideas such as officers favoring co-ethnic rule are not necessary to generate the loyalty side of the loyalty-efficiency tradeoff. Section 5 discusses this consideration in more detail and demonstrates alternative ways to model loyalty that yield a similar logic.

With regard to repressive ***efficiency***, professional and personalist militaries exhibit mixed considerations. On the one hand, the higher probability with which the professional military can repress effectively—which arises from assuming that $p\big(\theta_M,\theta_T\big)$ strictly increases in θ_M—creates an efficiency advantage. However, the professional military's higher reservation value to outsider rule creates a countervailing effect. Conditional on the military being able to repress effectively, the professional military is less likely to defend the regime (Lemma 3). This countervailing efficiency mechanism—largely overlooked in existing studies positing that rulers face a loyalty-efficiency tradeoff—creates the possibility that a personalist military can exhibit higher repressive efficiency despite its weaker coercive endowment.

Table 4: Dictator's Tradeoff Between Military Types

Mechanism	*Probability term*	*Professional*	*Personalist*
Loyalty	Pr(coup)		✓
Efficiency #1	Pr(repression is effective)	✓	
Efficiency #2	Pr(repress | repression is effective)		✓

3.3 A Loyalty-Efficiency Tradeoff?

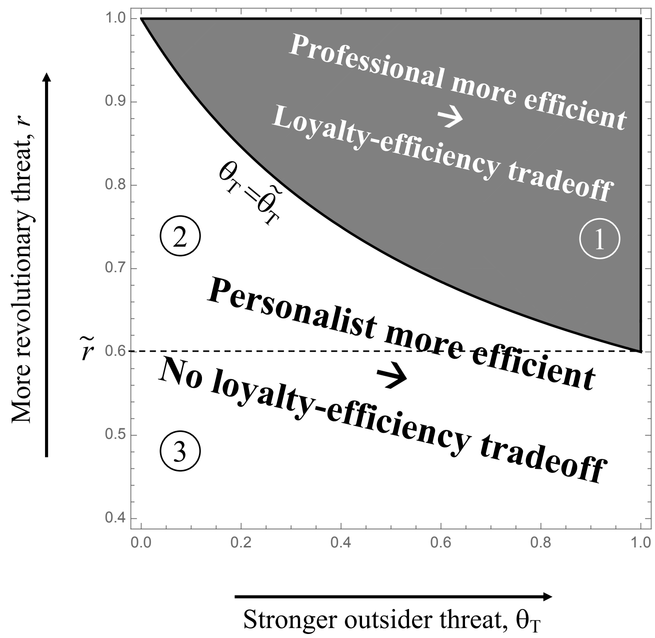
Does the dictator trade off between coup loyalty and repressive efficiency? Repressive efficiency equals the probability of no outsider overthrow conditional on no coup:

$$E^*\left(\theta_M, \theta_T, r\right) \equiv \underbrace{p\left(\theta_M, \theta_T\right)}_{\text{Pr(repression is effective)}} \cdot \underbrace{F\Big(\omega_D - \omega_T\left(\theta_M, r\right)\Big)}_{\text{Pr(repress | repression is effective)}} \tag{1}$$

Figure 5 presents a region plot as a function of outsider threat strength, θ_T (horizontal axis), and outsider orientation, r (vertical axis). A large-magnitude and revolutionary outsider threat yields the conventional wisdom: the professional military exhibits greater repressive efficiency than the personalist military (region 1 in gray). Two factors generate this result. First, if the threat is large in magnitude, then the professional military is considerably more likely to be able to repress effectively. Its higher coercive endowment $\overline{\theta}_M$ more effectively counteracts the negative effect of θ_T on the probability of effective repression, $p\left(\theta_M, \theta_T\right)$, which Figure 2 depicts. This implies that the magnitude of the first efficiency mechanism stated in Table 4—which favors the professional military—is large. Second, regarding the endogenous choice to exercise repression, a revolutionary threat implies that the professional military fares only slightly better under outsider rule than the personalist military because $\omega_T\left(\theta_M, r\right)$ is low for both, which Figure 4 depicts. This implies that the magnitude of the second efficiency mechanism in Table 4—which favors the personalist miliary—is small.

But not all parameter values uphold the standard loyalty-efficiency logic. Region 2 in white shows that at low values of θ_T, the *personalist* military is more repressively efficient—even if the threat is revolutionary. Facing a weak threat, the gap between $p\left(\overline{\theta}_M, \theta_T\right)$ and $p\left(\underline{\theta}_M, \theta_T\right)$ is small because either type of military likely can effectively repress a weak threat. Region 3 in white shows that the dictator also does not face a loyalty-efficiency tradeoff if the threat is non-revolutionary—regardless of its severity. When facing a non-revolutionary threat, the professional military fares considerably better under outsider rule than the personalist military, that is, $\omega_T\left(\overline{\theta}_M, r\right)$ is considerably larger than $\omega_T\left(\underline{\theta}_M, r\right)$. This creates a large gap in the

Figure 5: Repressive Efficiency



Notes: Figure 5 uses the same parameter values and functional form assumptions as Figures 2 through 4, and $\omega_D = 0.8$ and $\mu \sim U(0, 1-\omega_D)$.

two militaries' probability of exercising repression conditional on repression being effective. Combining this logic with the result that the personalist military exhibits higher coup loyalty for all parameter values implies that the dictator faces a loyalty-efficiency tradeoff if and only if the threat is strong and revolutionary.

Lemma 4 (Loyalty-efficiency tradeoff)**.** *There exist unique thresholds $\tilde{r} \in (0,1)$ and $\tilde{\theta}_T \in (0, \overline{\theta}_T)$ with the following properties:*

Part a. Non-revolutionary threat. *If $r < \tilde{r}$, then the dictator does not face a loyalty-efficiency tradeoff because the personalist military exhibits higher repressive efficiency for all $\theta_T \in (0, \overline{\theta}_T)$: $E^*(\underline{\theta}_M, \theta_T, r) > E^*(\overline{\theta}_M, \theta_T, r)$. Region 3 of Figure 5 depicts these parameter values.*

Part b. Revolutionary threat. *If $r > \tilde{r}$, then:*

- *If $\theta_T < \tilde{\theta}_T$, then the dictator does not face a loyalty-efficiency tradeoff because the personalist military exhibits higher repressive efficiency: $E^*(\underline{\theta}_M, \theta_T, r) > E^*(\overline{\theta}_M, \theta_T, r)$. Region 2 of Figure 5 depicts these parameter values.*
- *If $\theta_T > \tilde{\theta}_T$, then the dictator faces a loyalty-efficiency tradeoff because the professional military exhibits higher repressive efficiency: $E^*(\underline{\theta}_M, \theta_T, r) < E^*(\overline{\theta}_M, \theta_T, r)$. Region 1 of Figure 5 depicts these parameter values.*

4 Analysis of Dictator's Decision

4.1 Optimal Military Choice

When choosing its military, the dictator takes into account coup propensity and repressive efficiency. It maximizes its probability of survival, which equals the probability that the military exercises repression to defend the regime:

$$S^*\big(\theta_M,\theta_T,\theta_D,r\big) \equiv \underbrace{\Big[1-q\big(\theta_M,\theta_D\big)\Big]}_{\text{No coup opportunity}} \cdot \underbrace{p\big(\theta_M,\theta_T\big)\cdot F\Big(\omega_D-\omega_T\big(\theta_M,r\big)\Big)}_{\text{Repressive efficiency}} \tag{2}$$

There are two cases to consider. First, if the professional military's coup likelihood is sufficiently high, then the dictator will choose the personalist military regardless of repressive efficiency considerations. Extremely unpopular dictators cannot harness the (possible) repressive advantages of a professional military.

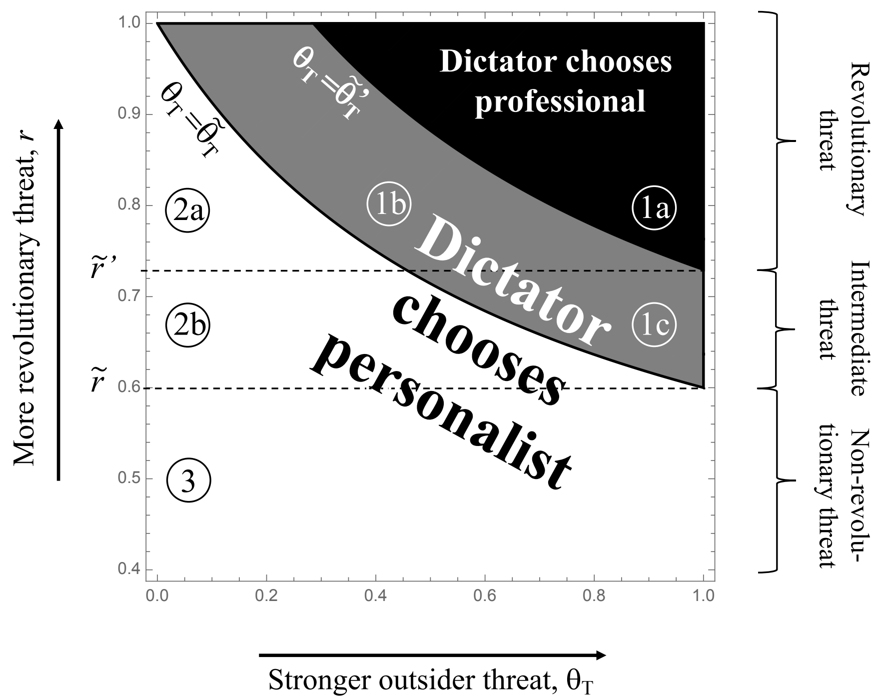
> **Proposition 1** (Unpopular dictators choose the personalist military)**.** *There exists a unique threshold $\tilde{\theta}_D \in \big(0,\overline{\theta}_D\big)$ such that if $\theta_D < \tilde{\theta}_D$, then the dictator chooses the personalist military:* $S^*\big(\underline{\theta}_M,\theta_T,\theta_D,r\big) > S^*\big(\overline{\theta}_M,\theta_T,\theta_D,r\big)$.

Higher θ_D yields the second and more strategically interesting case in which the dictator's choice over military type depends on repressive efficiency, analyzed above. The professional military is more likely to attempt a coup, which implies that the dictator chooses the personalist military under all parameter values in Lemma 4 in which the personalist military exhibits higher repressive efficiency—if the outsider threat is non-revolutionary and/or weak in magnitude. These are regions 2 and 3 in Figures 5 and 6. However, even for parameter values in which the professional military is more repressively efficient, the loyalty-efficiency tradeoff implies that the dictator does not necessarily choose the professional military. Although the dictator follows a similar threshold strategy as characterized in Lemma 4, it optimally chooses the professional military for a smaller range of parameter values than those for which the professional military exhibits higher repressive efficiency. Figure 6 shows this by distinguishing region 1a in black, in which the dictator chooses the professional military, from the gray regions 1b and 1c in which the dictator chooses the personalist military. Collectively, these three areas compose region 1 in Figure 5.[13] Propositions 1 and 2, combined

[13]Note that there is an intermediate threat range, $r \in \big(\tilde{r},\tilde{r}'\big)$, in which the professional military is more repressively efficient for large enough θ_T (region 1c in Figure 6), but the dictator chooses the personalist

with the actions stated in Table 3, characterize the unique subgame perfect Nash equilibrium.

Figure 6: Optimal Military Choice and Consequences



Notes: Figure 6 uses the same parameter values and functional form assumptions as the previous figures. In the white regions, the dictator does not face a loyalty-efficiency tradeoff and optimally chooses the personalist military. In the gray region, the dictator faces a loyalty-efficiency tradeoff and chooses the personalist military. In the black region, the dictator faces a loyalty-efficiency tradeoff and chooses the professional military.

Proposition 2 (Optimal military choice of popular dictators)**.** *Assume $\theta_D > \tilde{\theta}_D$, for $\tilde{\theta}_D$ defined in Proposition 1. Given the thresholds defined in Lemma 4, there exist unique thresholds $\tilde{r}' \in (\tilde{r}, 1)$ and $\tilde{\theta}_T' \in (\tilde{\theta}_T, \overline{\theta}_T)$ with the following properties:*

Part a. Non-revolutionary (and intermediate) threat. *If $r < \tilde{r}'$, then the dictator chooses a personalist military: $S^*\big(\underline{\theta}_M, \theta_T, \theta_D, r\big) > S^*\big(\overline{\theta}_M, \theta_T, \theta_D, r\big)$. Regions 1c, 2b, and 3 in Figure 6 depict these parameter values.*

Part b. Revolutionary threat. *If $r > \tilde{r}'$, then:*

- *If $\theta_T < \tilde{\theta}_T'$, then the dictator chooses a personalist military: $S^*\big(\underline{\theta}_M, \theta_T, \theta_D, r\big) > S^*\big(\overline{\theta}_M, \theta_T, \theta_D, r\big)$, for $S^*(\cdot)$ defined in Equation 2. Regions 1b and 2a in Figure 6 depict these parameter values.*
- *If $\theta_T > \tilde{\theta}_T'$, then the dictator chooses a professional military: $S^*\big(\underline{\theta}_M, \theta_T, \theta_D, r\big) < S^*\big(\overline{\theta}_M, \theta_T, \theta_D, r\big)$. Region 1a in Figure 6 depicts these parameter values.*

military for all θ_T. This is because the repressive efficiency advantage of the professional military is low enough in magnitude that the dictator is unwilling to sacrifice loyalty for efficiency.

4.2 A Guardianship Dilemma?

Do stronger outsider threats create a guardianship dilemma, that is, raise the equilibrium probability of a coup attempt? Existing arguments are incomplete because they link the guardianship dilemma logic to neither the loyalty-efficiency tradeoff nor the revolutionary nature of the outsider threat.

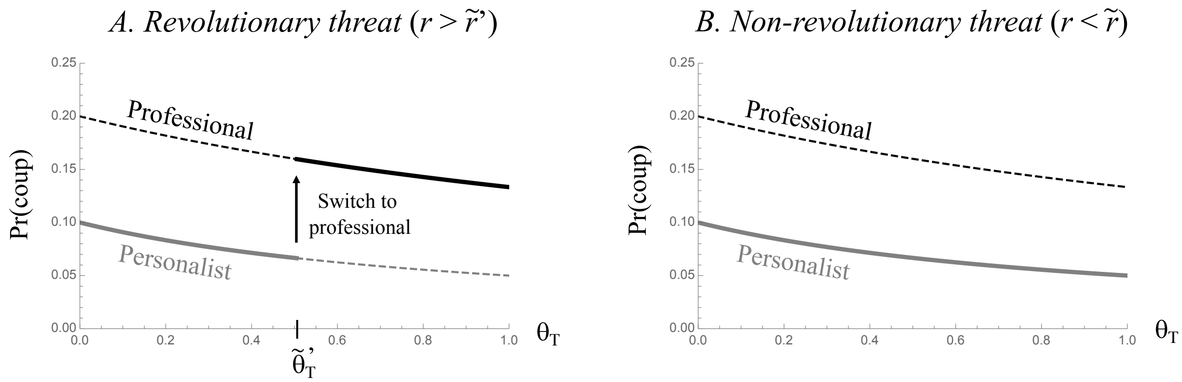
Figure 7 depicts the relationship between θ_T and the equilibrium probability of a coup, distinguishing between revolutionary (Panel A) and non-revolutionary (Panel B) threats. An increase in θ_T generates both a direct and an indirect effect. The direct effect is that higher θ_T decreases the probability that the military can effectively exercise repression. Contrary to the guardianship logic, this mechanism yields a *negative* relationship between outsider threat strength and equilibrium coup probability. This logic is independent of military type or the orientation of the outsider threat, as shown by the downward slope of all four curves in Figure 7. This resembles McMahon and Slantchev's (2015) finding that stronger outsider threats diminish the equilibrium probability of a coup attempt by decreasing the value of holding office.

However, the indirect effect of increasing θ_T recovers the traditional guardianship dilemma argument, contrary to McMahon and Slantchev's (2015) critique. If the outsider threat is revolutionary $\left(r > \tilde{r}'\right)$, then a strong outsider threat $\left(\theta_T > \tilde{\theta}_T\right)$ creates a loyalty-efficiency tradeoff for the dictator, which regions 1a and 1b in Figure 6 depict. For any increase in θ_T large enough to cross the $\theta_T = \tilde{\theta}'_T$ threshold that separates regions 1a and 1b, the dictator switches from the personalist to the professional military. This effect discretely *increases* the equilibrium probability of a coup attempt because the professional military exhibits higher coup propensity than the personalist military (see Table 4). Therefore, a revolutionary threat generates both a loyalty-efficiency tradeoff and a guardianship dilemma, which Panel A of Figure 7 shows.

By contrast, a non-revolutionary threat ($r < \tilde{r}$) eliminates the guardianship mechanism by eliminating the dictator's loyalty-efficiency tradeoff (see Lemma 4). The dictator never switches to the professional military, which implies that at no θ_T values does the equilibrium probability of a coup attempt exhibit a discrete increase. Panel B of Figure 7 depicts this result.[14]

[14] Although a loyalty-efficiency tradeoff is necessary for a guardianship dilemma, it is not sufficient (see regions 1c and 2b in Figure 6). For intermediate values $r \in \left(\tilde{r}, \tilde{r}'\right)$, although the professional military is more efficient than the personalist military for high enough θ_T, the dictator prefers the personalist military even at $\theta_T = \overline{\theta}_T$ because the difference in repressive efficiency is not large enough to compensate for the

Figure 7: Equilibrium Probability of a Coup



Notes: Solid segments of curves correspond with parameter values in which the dictator optimally chooses the specified type of military, and dashed segments correspond with off-the-equilibrium path outcomes. Therefore, the equilibrium coup probability equals the piecewise function created by the solid segments of curves. Both panels use the same parameter values and functional form assumptions as previous figures. In Panel A, $r = 0.88$. In Panel B, $r = 0.7$.

Proposition 3 (Threat strength and equilibrium coup probability)**.** *Given the thresholds stated in Propositions 1 and 2:*

Part a. Revolutionary threat. *If $\theta_D > \tilde{\theta}_D$ and $r > \tilde{r}'$, then the equilibrium probability of a coup strictly decreases in θ_T for $\theta_T \in \big(0, \tilde{\theta}'_T\big) \cup \big(\tilde{\theta}'_T, \overline{\theta}_T\big)$, and exhibits a discrete increase at $\theta_T = \tilde{\theta}'_T$.*

Part b. Non-revolutionary/intermediate threat. *If $\theta_D < \tilde{\theta}_D$ or $r < \tilde{r}'$, then the equilibrium probability of a coup strictly decreases in θ_T for all $\theta_T \in \big(0, \overline{\theta}_T\big)$.*

Proposition 4 (Threat orientation, loyalty-efficiency tradeoff, and guardianship dilemma)**.** *Given the thresholds stated in Lemma 4 and Propositions 1 and 2, if $\theta_D > \tilde{\theta}_D$, then:*

Part a. Revolutionary threat. *If $r > \tilde{r}'$, then the dictator faces both a loyalty-efficiency tradeoff and a guardianship dilemma.*

Part b. Non-revolutionary threat. *If $r < \tilde{r}$, then the dictator faces neither a loyalty-efficiency tradeoff nor a guardianship dilemma.*

Part c. Intermediate range. *If $r \in \big(\tilde{r}, \tilde{r}'\big)$, then the dictator faces a loyalty-efficiency tradeoff but not a guardianship dilemma.*

4.3 Effects of Dictator Popularity

Although the analysis focuses primarily on how characteristics of the external threat affect the dictator's optimal military choice, the dictator's endowed strength θ_D—which encompasses broader political institu-

difference in coup likelihood.

tions and popular support—also affects its choice. A dictator with high θ_D faces low coup vulnerability. Existing arguments posit that dictators should favor more broadly based professional militaries when facing a low coup threat. For example, Greitens (2016, 18) argues that dictators resolve their dual coup and outsider rebellion threats by "configuring their internal security apparatus to address the *dominant perceived threat* at the time they come to power. Prioritizing the threat of a coup leads to higher fragmentation and exclusivity, whereas focusing on the threat of popular uprising leads to a more unitary and socially inclusive apparatus."

The model produces two findings about the effects of increasing θ_D. The first supports Greitens' argument but the second does not. First, higher θ_D causes the dictator to weight repressive efficiency more heavily than the coup threat in its objective function because the type of military less strongly affects the probability of a coup. As $\theta_D \to \overline{\theta}_D$, the probability of a coup attempt goes to 0 regardless of θ_M, and the dictator's objective in Equation 2 is equivalent to maximizing efficiency (Equation 1). Graphically, as $\theta_D \to \overline{\theta}_D$, the black region in which the dictator prefers the professional military in Figure 6 converges to the gray region in Figure 5 in which the professional military exhibits higher repressive efficiency.

Second, lowering the coup threat does not necessarily cause the dictator to choose a professional military. The revised loyalty-efficiency logic explained by the model (see Figure 5) implies that when facing a non-revolutionary threat, the personalist military exhibits higher repressive efficiency regardless of the strength of the threat. Therefore, if $r < \tilde{r}$, then a low coup threat does not cause the dictator to switch to a "more unitary and socially inclusive apparatus" (Greitens 2016, 18). The existing argument is true only if the threat has a revolutionary orientation, $r > \tilde{r}$, which generates a loyalty-efficiency tradeoff for the dictator.

To formalize this logic, define the difference between equilibrium repressive efficiency and the dictator's equilibrium survival probability (for a given choice of θ_M):

$$\Delta \equiv E^*\big(\theta_M, \theta_T, r\big) - S^*\big(\theta_M, \theta_T, \theta_D, r\big) \tag{3}$$

Visually, Figure 6 shows that for fixed r, Δ equals the distance between $\tilde{\theta}'$ and $\tilde{\theta}$, i.e., the gray region.

Proposition 5 (Effects of dictator popularity)**.**

> ***Part a.*** *If the professional military exhibits higher repressive efficiency than the personalist military ($r > \tilde{r}$ and $\theta_T > \tilde{\theta}_T$; see Lemma 4), then for Δ defined in Equation 3:*
>
> - *An increase in θ_D increases the dictator's likelihood of choosing the professional military: $\frac{d\Delta}{d\theta_D} < 0$.*
> - *As the dictator becomes perfectly able to prevent coups, the dictator chooses the professional military: $\lim_{\theta_D \to \overline{\theta}_D} \Delta = 0$.*
>
> ***Part b.*** *If the personalist military exhibits higher repressive efficiency than the professional military ($r < \tilde{r}$ or $\theta_T < \tilde{\theta}_T$), then the dictator chooses the personalist military regardless of the value of θ_D.*

5 CONCEPTUALIZING LOYALTY

The baseline model proposes an opportunity-based loyalty mechanism by which the personalist military is less likely than the professional military to stage a coup. Substantively, the underlying assumption follows from more prevalent coup-proofing institutions inherent in a personalist military that diminish its opportunity to successfully stage a coup. But there are other differences between professional and personalist militaries that create variance in coup likelihood, which this section analyzes. Specifically, it proposes an inherent loyalty mechanism and a strategic loyalty mechanism that each connect the personalist military to lower coup propensity.

5.1 INHERENT LOYALTY

To capture *inherent loyalty*, I alter the model so that the personalist military enjoys higher expected consumption under the incumbent regime. Appendix Table B.1 provides the revised game tree. Now, at every information set for the military, it can attempt a coup that succeeds with probability 1. The function $q(\theta_M, \theta_D)$ instead determines the military's consumption under the incumbent regime. With probability q, the military's valuation of the incumbent regime is low, $\omega_D = \underline{\omega}_D \in (0, 1)$, and with complementary probability it is high, $\omega_D = \overline{\omega}_D > 1$. The same assumptions as in the baseline model apply to $q(\cdot)$, most important, that it strictly increases in θ_M. The difficulty of governing and of maintaining a hierarchical command chain while exerting political influence can cause a military to prefer civilian rule (Finer 2002), which corresponds with $\omega_D > 1$. By contrast, in the baseline model, the military necessarily prefers military dictatorship over the incumbent regime (but may lack a coup opportunity to achieve its most-preferred regime).

The military's optimal choices and the associated probabilities with which it chooses each are unchanged from the baseline model (see Table 3).[15] If $\omega_D = \underline{\omega}_D$, then the military prefers a coup over repression because it consumes more in a military dictatorship than in the incumbent regime. This is strategically identical to the information set in the baseline model in which the military has a coup opportunity. By contrast, if $\omega_D = \overline{\omega}_D$, then the military prefers repression to a coup—even though a coup attempt succeeds with probability 1—because it consumes more under the incumbent regime than in a military dictatorship. This is strategically identical to the information sets in the baseline model in which the military lacks a coup opportunity. Consequently, despite the different motivation for several parameters in this alteration, the dictator's survival objective function in Equation 2 is unchanged.

Compared to the professional military, the personalist military exhibits a higher expected valuation for the incumbent dictatorship, which implies a lower probability of staging a coup because $\omega_D = \overline{\omega}_D$ is necessary for choosing to defend the regime. This result captures the idea of inherent loyalty because the personalist military's stronger preferences to uphold the incumbent regime increase the dictator's probability of surviving. Existing research suggests many possible sources of higher inherent loyalty for narrowly constructed personalist militaries. One possibility is that officers gain some type of "warm glow" from co-ethnic governance. For example, Quinlivan's (1999, 135) section "The Exploitation of Special Loyalties" begins by stating: "The building block of political action in Saudi Arabia, Iraq, and Syria is the 'community of trust' that is willing to act together." Another is that members of different ethnic groups exhibit similar preferences over public goods, and higher expected ω_D expresses in reduced form that the personalist military consumes more because the dictator provides public goods that the military values more highly (Alesina et al. 1999). Other possibilities relate to the dictator's ability to commit to deliver spoils to the military. The descent-based characteristics of ethnic groups make it easier to commit to reward co-ethnics because it is difficult to hide or to change one's ethnicity (Caselli and Coleman 2013). Alternatively, co-ethnics may more effectively solve the coordination problems inherent in compelling the dictator to pay its subordinates after they have defended him in battle (Myerson 2008).

[15] Appendix Table B.1 changes the appropriate labels from Table 3 for the present extension.

5.2 STRATEGIC LOYALTY

The second alteration yields a strategic endogenous loyalty mechanism: the personalist military's lower reservation value to outsider rule lowers the likelihood of staging a coup. Appendix Figure B.2 presents the revised game tree. I retain the assumption from the inherent loyalty extension that upon attempting a coup the military displaces the incumbent dictator with probability 1, but revert to the assumption from the baseline model that both types of military consume the same amount $\omega_D < 1$ under the incumbent authoritarian regime. To generate a strategic loyalty mechanism, I assume a coup that successfully displaces the incumbent dictator yields a military dictatorship only with probability $\gamma \in (0, 1)$.[16] With complementary probability, a coup engenders outsider rule. In between the dictator's and military's moves, Nature draws γ from a smooth distribution $G(\cdot)$ with full support over $[0, 1]$. As with the other Nature moves, this ensures an ex ante positive probability of the military choosing any of its options. The bounds of the support for $G(\cdot)$ are strategically equivalent to different information sets in the baseline model: $\gamma = 0$ is equivalent to lacking a coup opportunity because the military cannot establish a military dictatorship, and $\gamma = 1$ is equivalent to having a coup opportunity because a coup attempt ensures a military dictatorship.

Various substantive considerations motivate the additional Nature move following the military's decision to stage a coup that determines whether the military or the outsider controls the next regime. Empirically, within several years after staging a coup, militaries often hold elections. This pattern is even more prevalent since the Cold War ended. This fits with the present conceptualization of transitioning to outsider rule because the generals did not create a consolidated military dictatorship. In some cases, the military may indeed have planned to hand power over to civilians from the beginning, whereas in other cases the military may have gambled that it could hold on—but instead ended up negotiating a transition because of concerted domestic or international pressure.

The first necessary condition in the baseline model for the military to defend the regime is unchanged: the cost of repression μ is low enough that the military prefers repression to transitioning. However, the second

[16] Although this parameter resembles $q(\cdot)$ from the baseline model and the inherent loyalty extension because it affects the military's coup option, I use new notation to avoid confusion because γ is not a function of θ_M and θ_D.

necessary condition—the military prefers repression to a coup—is met if and only if:

$$\underbrace{\omega_D - \mu}_{\text{Military's utility to defending regime}} > \underbrace{\gamma + (1-\gamma)\cdot\omega_T\big(\theta_M, r\big) - \mu}_{\text{Military's utility to coup}} \tag{4}$$

Solving Equation 4 for γ and imposing the assumed probability distribution implies that the dictator's survival objective function is:

$$S^*_{sl}\big(\theta_M,\theta_T,\theta_D,r\big) \equiv \underbrace{G\left(\frac{\omega_D - \omega_T\big(\theta_M,r\big)}{1-\omega_T\big(\theta_M,r\big)}\right)}_{\text{Prefers repression to coup}} \cdot \underbrace{p\big(\theta_M,\theta_T\big)\cdot F\Big(\omega_D - \omega_T\big(\theta_M,r\big)\Big)}_{\text{Repressive efficiency}}, \tag{5}$$

where the subscript sl expresses strategic loyalty. Although the efficiency component of the survival function is identical to that in the baseline model, the coup component differs. Now, whether or not the military will repress to defend the dictator rather than stage a coup depends not only on the draw of γ,[17] but also on its reservation value to outsider rule, $\omega_T\big(\theta_M, r\big)$. The personalist military is less likely to stage a coup than the professional military—despite equally valuing the incumbent regime and facing identical opportunities to overthrow the dictator—because it more greatly fears the possibility of outsider rule, consistent with higher *strategic loyalty*.[18] Appendix Proposition B.1 formalizes this logic.

6 Gambling for Resurrection

Although dictators value surviving in office—the dictator's only objective in the baseline model—many analyze how the institutional basis of regimes affects rulers' decisions (Geddes et al. 2014; Debs 2016). Some study incentives to gamble for resurrection in the form of mass repression or fighting international wars: costly gambles that increase the ruler's probability of survival despite worsening its fate conditional on losing power. However, we know much less about how attributes of the opposition affect the ruler's calculus, which we can analyze in the present model because it focuses on the orientation of the outsider. I alter the model to (1) allow dictators to vary in their fates under outsider rule and (2) shift the dictator's strategic focus from choosing the type of military to affecting the orientation of the outsider threat.

[17] In the baseline game, this choice by the military depends on whether or not it has a coup opportunity.

[18] Unlike in the baseline game, the coup term in the dictator's objective function, $G\left(\frac{\omega_D-\omega_T(\theta_M,r)}{1-\omega_T(\theta_M,r)}\right)$, does not equal the equilibrium probability of a coup attempt, as Appendix Section B.4 discusses.

A casual survey of dictators' fates following revolutionary overthrow highlights the perils of extremist movements. French king Louis XVI faced the guillotine in 1793, Bolshevik guards executed Russian emperor Nicholas II in 1918, and rebels in Libya publicly displayed Muammar Gaddafi's body for four days after finding and assassinating him in 2011. However, the baseline model highlights a selection effect that explains why a dictator might prefer a *more* revolutionary opposition: high incentives for the military to exercise repression. This section shows how this strategic effect can cause dictators with a narrow support base to gamble for resurrection by provoking extremist opposition leaders, whereas more popular regimes do not hang onto power at all costs.

To make the dictator's tradeoff non-trivial, we need to extend the model such that the dictator consumes $\omega_T(\theta_D, r)$ under outsider rule, rather than 0. This is the same function as the the military's consumption under outsider rule in the baseline model, but for the dictator I switch the coercive capacity parameter from θ_M to θ_D.[19] I also take out elements of the baseline model that are not essential for studying the dictator's preferences to gamble for resurrection: military type is fixed at an exogenous θ_M, and the probability of a coup opportunity, $q(\cdot)$, equals 0. Instead, I add another strategic choice for the dictator: determining the orientation of the outsider threat by setting $r \in [0, 1]$. Substantively, the choice to raise r is reduced form for actions such as using the secret police and intelligence agencies to spy on the mainstream opposition and arrest their leaders, therefore driving mainstream movements underground and leaving only extremists to openly oppose the regime.[20] Appendix Figure B.3 depicts the revised game tree.

Equation 6 presents the dictator's optimization problem under these alterations:[21]

$$\max_{r\in[0,1]} \quad \underbrace{p\big(\theta_M, \theta_T\big) \cdot F\Big(\omega_D - \omega_T\big(\theta_M, r\big)\Big)}_{\text{Military more likely to repress}} + \Big[1 - p(\cdot) \cdot F(\cdot)\Big] \cdot \underbrace{\omega_T(\theta_D, r)}_{\text{Lower payoff under outsider rule}} \tag{6}$$

[19]The properties of $\omega_T(\cdot)$ introduced above imply that the dictator's maximum utility under outsider rule is ω_D, the same as the military's. Any parameter valued between 0 and 1 (exclusive) would yield qualitatively identical results.

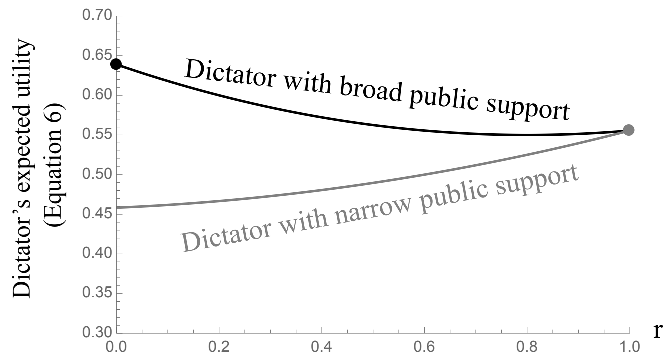
[20]Although it is implausible in the real world that such actions would not also affect θ_T, empirically, the effect could go in either direction: either narrowing the opposition and reducing θ_T (perhaps reinforced by moderate opposition figures not wanting to contribute to an extremist-led movement), or raising θ_T by sparking widespread discontent. I fix θ_T to focus specifically on the dictator's tradeoff regarding r.

[21]The military's information set is identical to that in the baseline model without a coup opportunity.

In addition to switching the dictator's choice variable from θ_M to r and setting the probability of a coup to 0, this objective function differs from that in Equation 2 because the dictator consumes a positive amount even if it loses power—and therefore its objective is not equivalent to maximizing the probability of political survival. Equation 6 highlights two countervailing effects of r. The first is the beneficial indirect strategic effect from the baseline model: higher r raises the military's probability of exercising repression, which raises the probability that the dictator will consume 1 rather than $\omega_T(\theta_D, r) < 1$. This effect arises because higher r decreases the military's utility under outsider rule, $\omega_T\big(\theta_M, r\big)$, and therefore increases the range of μ values low enough that the military optimally exercises repression (at the information set in which Nature enables the military to repress effectively). The second is the deleterious direct effect of r, which arises from assuming that $\omega_T(\cdot)$ strictly decreases in r. That is, conditional on outsider rule occurring, the dictator prefers a less revolutionary opposition.

Figure 8 summarizes the main result by distinguishing the calculus for a dictator with high θ_D (black line) from that for a dictator with low θ_D (gray line). Whereas a popular dictator maximizes its utility by setting $r^* = 0$ (black dot), an unpopular dictator maximizes utility with $r^* = 1$ (gray dot). That is, unpopular dictators choose high r to maximize the probability of regime survival, whereas popular dictators sacrifice a lower survival probability for greater consumption under outsider rule. Narrowly based rulers prioritize surviving at all costs—hence gambling for resurrection—because they expect a bad fate even if non-revolutionary actors take control. Formally, the negative cross-partial between θ_D and r implies that the direct effect of r on lowering $\omega_T(\theta_D, r)$ (see Equation 6) is small in magnitude if θ_D is low, causing the dictator to prioritize the indirect effect by which higher r increases the probability that the military exercises repression. By contrast, a more popular dictator expects a relatively favorable post-tenure fate under a non-revolutionary outsider. By increasing the magnitude of the direct effect of r on decreasing $\omega_T(\theta_D, r)$, higher θ_D diminishes the dictator's incentives to raise r. Figure 8 also shows that the utility lines converge at $r = 1$ because of the boundary condition that any actor consumes 0 if the opposition is ideal-type revolutionary.

Figure 8: Gambling for Resurrection: Popular vs. Unpopular Dictators



Notes: Figure 8 uses the parameter values $\theta_T = 0.8$, $\theta_M = 1$, $\omega_D = 0.5$, and assumes $p(\theta_M, \theta_T) = \frac{\theta_M}{\theta_M + \theta_T}$ and $\omega_T(\theta, r) = \left(\theta/\overline{\theta}\right) \cdot (1-r) \cdot \omega_D$. For the black curve, $\theta_D = 1$, and for the gray curve, $\theta_D = 0.5$.

7 Conclusion

This paper presents a model in which a dictator facing an outsider threat chooses between a personalist and a professional military, and the military can choose to defend the regime by exercising repression, stage a coup, or negotiate a transition to outsider rule. The main results challenge two important premises regarding the existence of a loyalty-efficiency tradeoff and its consequences for the guardianship dilemma. Although the primary contribution of this paper is theoretical, the logic also generates important empirical implications.

Broad literatures on civil conflict, contentious politics, and authoritarian regimes analyze various challenges that dictators face. One important takeaway from the present analysis is that different types of challenges create differential incentives for rulers. Scholars such as Bellin (2012) studying urban protests emphasize the importance of personalist militaries for defeating the threats. By contrast, scholars such as Quinlivan (1999), Powell (2014), Talmadge (2015), and Roessler (2016) that focus on counterinsurgency highlight the drawbacks of personalist militaries as effective fighting units. The present analysis suggests that an underemphasized difference between these types of cases is how the orientation of the outsider threat affects the military's incentives to fight, as opposed to the tactics of the opposition or the geography of rebellion per se. Nonviolent urban protests, especially successful ones, often feature broad-based and diverse membership (Chenoweth and Stephan 2011), therefore posing a non-revolutionary threat. By contrast, violent insurgent groups are more likely to pose an existential revolutionary threat. Focusing on the interaction between the type of military and type of threat can also explain variance within these modes of contention. Many civil wars end with negotiated pacts rather than outright defeat, but this should only be possible when facing a non-revolutionary threat. By contrast, largely peaceful urban protests often fail when facing a military whose fate is intimately tied to that of the incumbent regime, as occurred in Burma in 1988 and China in 1989.

These considerations also highlight a dictator's perilous position if its main threat changes. For example, Egypt's international competition with Israel and regional influence created benefits from developing a professional and competent army. Yet this made the regime more vulnerable to downfall in 2011 when mass, non-revolutionary protests broke out in Cairo and Alexandria. By contrast, many African rulers favored more personalist oriented militaries after independence to mitigate their coup risk—therefore leaving these regimes more susceptible to facing credible outsider rebellions even amid considerable foreign aid from superpowers (Roessler 2016). However, when this aid diminished considerably after the Cold War, outsider rebellions toppled many of these regimes (e.g., Rwanda, Zaire) because the militaries lacked basic capacity—suggesting that the dictators would have benefitted from more professional militaries.

Overall, scrutinizing the logical relationships implied by the model and their empirical implications will hopefully spur productive future research on the central questions of how dictators craft their militaries and how this choice affects regime survival.

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A Proofs for Baseline Model

Table A.1: Summary of Parameters and Choice Variables

Aspect of game	Variables/description
Coercive endowments	• Dictator: θ_D, with maximum value $\overline{\theta}_D$ • Outsider threat: θ_T, with maximum value $\overline{\theta}_T$ • Military: $\underline{\theta}_M$ for personalist and $\overline{\theta}_M$ for professional
Military's utility to defending the regime	• ω_D: Military's consumption under incumbent dictator • $p(\theta_M, \theta_T)$: Probability repression is effective • μ: Military's cost of repression with maximum value $\overline{\mu}$ • $F(\cdot)$: Distribution function for repression cost, with pdf $f(\cdot)$
Military's utility to coup	• $q(\theta_M, \theta_D)$: Probability the military has a coup opportunity
Military's utility to negotiated transition	• r: Orientation of outsider threat (higher is more revolutionary) • $\omega_T\big(\theta_M, r\big)$: Military's consumption under outsider rule

Lemmas 1 through 3 follow trivially from the assumptions. I use the following to prove Lemma 4.

Lemma A.1. *For E^* defined in Equation 1:*

Part a.
$$\frac{d^2 E^*}{d\theta_M dr} > 0$$

Part b.
$$\frac{d^2 E^*}{d\theta_M d\theta_T} > 0$$

Proof. The first derivative is:

$$\frac{dE^*}{d\theta_M} = \underbrace{\overbrace{\frac{\partial p}{\partial \theta_M} \cdot F\big(\omega_D - \omega_T(\theta_M, r)\big)}^{1}}_{\text{(+) } \uparrow \text{ Pr(effective repression)}} - \underbrace{\overbrace{p(\theta_M, \theta_T) \cdot f\big(\omega_D - \omega_T(\theta_M, r)\big) \cdot \frac{\partial \omega_T}{\partial \theta_M}}^{2}}_{\text{(–) } \downarrow \text{ Pr(defend regime | effective rep.)}} >< 0$$

Part a.

$$\frac{d^2 E^*}{d\theta_M dr} = \underbrace{\frac{\partial p}{\partial \theta_M} \cdot f\big(\omega_D - \omega_T(\theta_M, r)\big) \cdot \left(- \frac{\partial \omega_T}{\partial r} \right)}_{\text{(+) } \uparrow \text{ magnitude of } 1 \text{ by } \uparrow \text{ Pr(defend regime | effective rep.)}}$$

$$\underbrace{+ p(\theta_M, \theta_T) \cdot f\big(\omega_D - \omega_T(\theta_M, r)\big) \cdot \left(- \frac{\partial^2 \omega_T}{\partial \theta_M \partial r} \right)}_{\text{(+) } \downarrow \text{ magnitude of } 2 \text{ by } \downarrow \text{ effect of } \theta_M \text{ on } \omega_T}$$

$$\underbrace{+ p(\theta_M, \theta_T) \cdot \Big[- f'\big(\omega_D - \omega_T(\theta_M, r)\big) \Big] \cdot \left(- \frac{\partial \omega_T}{\partial r} \right) \cdot \frac{\partial \omega_T}{\partial \theta_M}}_{\text{(+) } \downarrow \text{ magnitude of } 2 \text{ by } \uparrow \text{ Pr(defend regime | effective rep.)}} > 0$$

Part b.

$$\frac{d^2E^*}{d\theta_M d\theta_T} = \underbrace{\frac{\partial^2 p}{\partial\theta_M \partial\theta_T} \cdot F\big(\omega_D - \omega_T(\theta_M, r)\big)}_{\text{(+)} \uparrow \text{ magnitude of } 1 \text{ by} \uparrow \text{effect of } \theta_M \text{ on Pr(effective rep.)}}$$

$$+ \underbrace{\left(-\frac{\partial p}{\partial\theta_T}\right) \cdot f\big(\omega_D - \omega_T(\theta_M, r)\big) \cdot \frac{\partial\omega_T}{\partial\theta_M}}_{\text{(+)} \downarrow \text{ magnitude of } 2 \text{ by} \downarrow \text{Pr(effective rep.)}} > 0$$

■

The first derivative shows the two countervailing effects of an increase in θ_M on equilibrium repressive efficiency. Mechanism 1 is positive because higher θ_M raises the probability that the military can repress effectively. Mechanism 2 is negative because higher θ_M decreases the probability that the military defends the regime conditional on effective repression, which follows from $\frac{\partial\omega_T}{\partial\theta_M} > 0$. The effects encompassed in the second derivatives are:

- **Part a.** An increase in r increases the magnitude of $\frac{dE^*}{d\theta_M}$ if that term is positive, and decreases its magnitude if it negative, through three effects:
  - Increases the magnitude of mechanism 1 by increasing the probability that the military defends the regime conditional on effective repression because $\frac{\partial\omega_T}{\partial r} < 0$.
  - Decreases the magnitude of mechanism 2 by decreasing the magnitude of the positive effect of θ_M on ω_T because $\frac{\partial^2\omega_T}{\partial\theta_M \partial r} < 0$.
  - Decreases the magnitude of mechanism 2 by increasing the probability that the military defends the regime conditional on effective repression because $\frac{\partial\omega_T}{\partial r} < 0$.
- **Part b.** An increase in θ_T increases the magnitude of $\frac{dE^*}{d\theta_M}$ if that term is positive, and decreases its magnitude if it negative, through two effects:
  - Increases the magnitude of mechanism 1 by increasing the magnitude of the positive effect of θ_M on the probability the military can repress effectively because $\frac{\partial^2 p}{\partial\theta_M \partial\theta_T} > 0$.
  - Decreases the magnitude of mechanism 2 by decreasing the probability the military can repress effectively because $\frac{\partial p}{\partial\theta_T} < 0$.

Proof of Lemma 4, part a. Part b of Lemma A.1 implies that if $E^*\big(\underline{\theta}_M, \overline{\theta}_T, r\big) > E^*\big(\overline{\theta}_M, \overline{\theta}_T, r\big)$, then this inequality holds for all $\theta_T \in \big(0, \overline{\theta}_T\big)$. Showing that the conditions for the intermediate value theorem hold establishes the existence of at least one $\tilde{r} \in (0,1)$ such that $E^*\big(\underline{\theta}_M, \overline{\theta}_T, \tilde{r}\big) = E^*\big(\overline{\theta}_M, \overline{\theta}_T, \tilde{r}\big)$:

- $E^*\big(\underline{\theta}_M, \underline{\theta}_T, 0\big) = p\big(\underline{\theta}_M, \overline{\theta}_T\big) \cdot \underbrace{F\Big(\omega_D - \omega_T\big(\underline{\theta}_M, r\big)\Big)}_{>0} < p\big(\overline{\theta}_M, \overline{\theta}_T\big) \cdot \underbrace{F(0)}_{=0} = E^*\big(\overline{\theta}_M, \overline{\theta}_T, 0\big)$

  follows from assuming $\omega_T\big(\overline{\theta}_M, 0\big) = \omega_D$.

- $E^*\big(\underline{\theta}_M, \overline{\theta}_T, 1\big) = p\big(\underline{\theta}_M, \overline{\theta}_T\big) \cdot F\big(\omega_D\big) < p\big(\overline{\theta}_M, \overline{\theta}_T\big) \cdot F\big(\omega_D\big) = E^*\big(\overline{\theta}_M, \overline{\theta}_T, 1\big)$ follows from assuming $\omega_T\big(\theta_M, 1\big) = 0$ for $\theta_M \in \big\{\underline{\theta}_M, \overline{\theta}_M\big\}$.
- Continuity trivially holds.

The unique threshold claim for $\tilde{r}$ follows from $\frac{d^2E^*}{d\theta_M dr} > 0$ (part a of Lemma A.1).

Part b. Showing that the conditions for the intermediate value theorem hold establishes that if $r < \tilde{r}$, then there exists at least one $\tilde{\theta}_T \in \big(0, \overline{\theta}_T\big)$ such that $E^*\big(\underline{\theta}_M, \tilde{\theta}_T, r\big) = E^*\big(\overline{\theta}_M, \tilde{\theta}_T, r\big)$:

- $E\big(\underline{\theta}_M, 0, r\big) = F\Big(\omega_D - \omega_T\big(\underline{\theta}_M, r\big)\Big) > F\Big(\omega_D - \omega_T\big(\overline{\theta}_M, r\big)\Big) = E\big(\overline{\theta}_M, 0, r\big)$ follows from assuming $p(\theta_M, 0) = 1$ for $\theta_M \in \big\{\underline{\theta}_M, \overline{\theta}_M\big\}$.
- $E\big(\underline{\theta}_M, \overline{\theta}_T, r\big) < E\big(\overline{\theta}_M, \overline{\theta}_T, r\big)$ follows from assuming $r < \tilde{r}$ (see the proof for part a).
- Continuity trivially holds.

The unique threshold claim for $\tilde{\theta}_T$ follows from $\frac{d^2E^*}{d\theta_M d\theta_T} > 0$ (part b of Lemma A.1). ■

The following assumption characterizes the lower bounds for the magnitude of two second derivatives mentioned in the text.

Assumption A.1. *The proof for Lemma A.2 defines the following thresholds.*

Part a.
$$-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} > \underline{\partial^2 \omega_T}$$

Part b.
$$-\frac{\partial^2 q}{\partial \theta_M \partial \theta_D} > \underline{\partial^2 q}$$

I use the following technical lemma to prove the propositions.

Lemma A.2. *For S^* defined in Equation 2:*

Part a.
$$\frac{d^2 S^*}{d\theta_M dr} > 0$$

Part b.
$$\frac{d^2 S^*}{d\theta_M d\theta_D} > 0$$

Part c.
$$\frac{d^2 S^*}{d\theta_M d\theta_T} > 0$$

Proof. The first derivative is:

$$\frac{dS^*}{d\theta_M} = \left[1 - q(\theta_M, \theta_D)\right] \cdot \underbrace{\frac{dE^*}{d\theta_M}}_{\text{(+/–) Lemma A.1}} \quad \underbrace{\overbrace{-\frac{\partial q}{\partial \theta_M} \cdot p(\theta_M, \theta_T) \cdot F\Big(\omega_D - \omega_T(\theta_M, r)\Big)}^{3}}_{\text{(–)} \uparrow \text{Pr(coup opportunity)}} >< 0 \quad \text{(A.1)}$$

Part a.

$$\frac{d^2S^*}{d\theta_M dr} = \left[1 - q(\theta_M, \theta_D)\right] \cdot \underbrace{\frac{d^2E^*}{d\theta_M dr}}_{\text{(+) Lemma A.1}} \underbrace{-\frac{\partial q}{\partial \theta_M} \cdot p(\theta_M, \theta_T) \cdot f\Big(\omega_D - \omega_T(\theta_M, r)\Big) \cdot \Big(-\frac{\partial \omega_T}{\partial r}\Big)}_{\text{(–)} \downarrow \text{magnitude of } 3 \text{ by } \uparrow \text{Pr(defend regime} \mid \text{effective rep.)}} >< 0$$

Eliding the terms in parentheses, substituting in terms for $\frac{d^2E^*}{d\theta_M dr}$ from the Lemma A.1 proof shows that the overall term is strictly positive if and only if:

$$-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} > \underline{\partial^2 \omega_T} \equiv$$

$$\left\{(1-q) \cdot \left[\frac{\partial q}{\partial \theta_M} \cdot p \cdot f(\cdot) - \frac{\partial p}{\partial \theta_M} \cdot f(\cdot) + p \cdot \Big[-f'(\cdot)\Big] \cdot \frac{\partial \omega_T}{\partial \theta_M}\right]\right\} \cdot \Big(-\frac{\partial \omega_T}{\partial r}\Big) \cdot \frac{1}{(1-q) \cdot p \cdot f(\cdot)}, \quad \text{(A.2)}$$

which part a of Assumption A.1 assumes is true.

Part b.

$$\frac{d^2S^*}{d\theta_M d\theta_D} = \underbrace{\Big(-\frac{\partial q}{\partial \theta_D}\Big) \cdot \frac{dE^*}{d\theta_M}}_{\text{(+/–)} \uparrow \text{magn. of } \frac{dE^*}{d\theta_M} \text{ by } \downarrow \text{Pr(coup opp.)}} + \underbrace{\Big(-\frac{\partial^2 q}{\partial \theta_M \partial \theta_D}\Big) \cdot p(\theta_M, \theta_T) \cdot F\big(\omega_D - \omega_T(\theta_M, r)\big)}_{\text{(+)} \downarrow \text{magnitude of } 3 \text{ by } \downarrow \text{effect of } \theta_M \text{ on } q} >< 0$$

Eliding the terms in parentheses, substituting in terms for $\frac{dE^*}{d\theta_M}$ from the Lemma A.1 proof shows that the overall term is strictly positive if and only if:

$$-\frac{\partial^2 q}{\partial \theta_M \partial \theta_D} > \underline{\partial^2 q} \equiv \Big(-\frac{\partial q}{\partial \theta_D}\Big) \cdot \left[p \cdot f(\cdot) \cdot \frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot F(\cdot)\right] \cdot \frac{1}{p \cdot F(\cdot)}, \quad \text{(A.3)}$$

which part b of Assumption A.1 assumes is true.

Part c.

$$\frac{d^2S^*}{d\theta_M d\theta_T} = \left[1 - q(\theta_M, \theta_D)\right] \cdot \underbrace{\frac{d^2E^*}{d\theta_M d\theta_T}}_{\text{(+) Lemma A.1}} + \underbrace{\frac{\partial q}{\partial \theta_M} \cdot \Big(-\frac{\partial p}{\partial \theta_T}\Big) \cdot F\big(\omega_D - \omega_T(\theta_M, r)\big)}_{\text{(+)} \downarrow \text{magnitude of } 3 \text{ by } \downarrow \text{Pr(effective rep.)}} > 0$$

∎

Remark A.1 simplifies the complementarity thresholds from Assumption A.1 using the functional form assumptions from Figures 5 and 7.

Remark A.1 (Illustration of complementarity thresholds)**.** *Assume the following functional forms:*

- $p(\theta_M, \theta_T) = 1 - \theta_T \cdot (1 - \theta_M)$
- $\omega_T(\theta_M, r) = \left(\theta_M / \overline{\theta}_M\right) \cdot (1 - r) \cdot \omega_D$
- $\mu \sim U(0, 1 - \omega_D)$
- $q(\theta_M, \theta_D) = \left(\theta_M / \overline{\theta}_M\right) \cdot (1 - \theta_D)$

Part a. *If $\theta_D > \frac{1}{2}$, then Part a of Assumption A.1 holds for all $\theta_T \in \left(0, \overline{\theta}_T\right)$ and $\theta_M \in \left\{\underline{\theta}_M, \overline{\theta}_M\right\}$.*

Part b. *If $r > \frac{1}{2}$, then Part b of Assumption A.1 holds for all $\theta_T \in \left(0, \overline{\theta}_T\right)$ and $\theta_M \in \left\{\underline{\theta}_M, \overline{\theta}_M\right\}$.*

Proof. The following preliminary result shows that the right-hand side of Equations A.2 and A.3 reach their upper bound at $\theta_T = 0$:

$$\frac{d}{d\theta_T}\left[-\frac{\partial p}{\partial \theta_M} \cdot \frac{1}{p(\theta_M, \theta_T)}\right] = -\left[\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} \cdot \frac{1}{p} + \frac{\partial p}{\partial \theta_M} \cdot \frac{-\frac{\partial p}{\partial \theta_T}}{p^2}\right] < 0$$

Therefore, if the inequalities hold at $\theta_T = 0$, then they hold for all $\theta_T \in \left(0, \overline{\theta}_T\right)$.

Part a. Substituting the functional form assumptions and $\theta_T = 0$ into Equation A.2 yields:

$$\frac{\omega_D}{\overline{\theta}_M} > \frac{1 - \theta_D}{\overline{\theta}_M} \cdot \frac{1}{1 - \frac{\theta_M}{\overline{\theta}_M} \cdot (1 - \theta_D)} \cdot \frac{\theta_M}{\overline{\theta}_M} \cdot \omega_D,$$

which simplifies to:

$$\theta_D > 1 - \frac{1}{2} \cdot \frac{\overline{\theta}_M}{\theta_M}$$

Because the right-hand side achieves its upper bound at $\theta_M = \overline{\theta}_M$, substituting in $\theta_M = \overline{\theta}_M$ yields the claim.

Part b. Substituting the functional form assumptions and $\theta_T = 0$ into Equation A.3 yields:

$$\frac{1}{\overline{\theta}_M} > \frac{1}{\omega_D - \frac{\theta_M}{\overline{\theta}_M} \cdot (1 - r) \cdot \omega_D} \cdot \frac{1}{\overline{\theta}_M} \cdot (1 - r) \cdot \omega_D \cdot \frac{\theta_M}{\overline{\theta}_M},$$

which simplifies to:

$$r > 1 - \frac{1}{2} \cdot \frac{\overline{\theta}_M}{\theta_M}$$

Because the right-hand side achieves its upper bound at $\theta_M = \overline{\theta}_M$, substituting in $\theta_M = \overline{\theta}_M$ yields the claim. ■

Proof of Proposition 1. Parts a and c of Lemma A.2 imply that if $S^*\big(\underline{\theta}_M, \overline{\theta}_T, 1, \theta_D\big) > S^*\big(\overline{\theta}_M, \overline{\theta}_T, 1, \theta_D\big)$, then this inequality holds for all $\theta_T \in \big(0, \overline{\theta}_T\big)$ and $r \in \big(0, 1\big)$. Showing that the conditions for the intermediate value theorem hold establishes the existence of at least one $\tilde{\theta}_D \in \big(0, \overline{\theta}_D\big)$ such that $S^*\big(\underline{\theta}_M, \overline{\theta}_T, 1, \tilde{\theta}_D\big) = S^*\big(\overline{\theta}_M, \overline{\theta}_T, 1, \tilde{\theta}_D\big)$:

- If $\theta_D = 0$, then $q\big(\underline{\theta}_M, 0\big) < q\big(\overline{\theta}_M, 0\big) = 1$, which implies $S^*\big(\underline{\theta}_M, \overline{\theta}_T, 1, 0\big) > S^*\big(\overline{\theta}_M, \overline{\theta}_T, 1, 0\big) = 0$.
- If $\theta_D = \overline{\theta}_D$, then $q\big(\underline{\theta}_M, \overline{\theta}_D\big) = q\big(\overline{\theta}_M, \overline{\theta}_D\big) = 0$. This implies that $S^*\big(\underline{\theta}_M, \overline{\theta}_T, 1, \overline{\theta}_D\big) = E^*\big(\underline{\theta}_M, \overline{\theta}_T, 1\big)$ and $S^*\big(\overline{\theta}_M, \overline{\theta}_T, 1, \overline{\theta}_D\big) = E^*\big(\overline{\theta}_M, \overline{\theta}_T, 1\big)$. The proof for part b of Lemma 4 shows that $E^*\big(\underline{\theta}_M, \overline{\theta}_T, 1\big) < E^*\big(\overline{\theta}_M, \overline{\theta}_T, 1\big)$.
- Continuity is trivially satisfied.

The unique threshold claim for $\tilde{\theta}_D$ follows from $\frac{d^2 S^*}{d\theta_M d\theta_D} > 0$ (part b of Lemma A.2). ■

Proof of Proposition 2, part a. Part c of Lemma A.2 implies that if $S^*\big(\underline{\theta}_M, \overline{\theta}_T, r, \theta_D\big) > S^*\big(\overline{\theta}_M, \overline{\theta}_T, r, \theta_D\big)$, then this inequality holds for all $\theta_T \in \big(0, \overline{\theta}_T\big)$. Showing that the conditions for the intermediate value theorem hold establishes that if $\theta_D > \tilde{\theta}_D$, then there exists at least one $\tilde{r}' \in \big(\tilde{r}, 1\big)$ such that $S^*\big(\underline{\theta}_M, \overline{\theta}_T, \tilde{r}', \theta_D\big) = S^*\big(\overline{\theta}_M, \overline{\theta}_T, \tilde{r}', \theta_D\big)$:

- $S^*\big(\underline{\theta}_M, \overline{\theta}_T, \tilde{r}, \theta_D\big) > S^*\big(\overline{\theta}_M, \overline{\theta}_T, \tilde{r}, \theta_D\big)$ simplifies to $q\big(\overline{\theta}_M, \theta_D\big) > q\big(\underline{\theta}_M, \theta_D\big)$, a true statement, because the two types of military exhibit the same repressive efficiency at these parameter values (see the definition of $\tilde{r}$ in the proof for part b of Lemma 4).
- $S^*\big(\underline{\theta}_M, \overline{\theta}_T, 1, \theta_D\big) < S^*\big(\overline{\theta}_M, \overline{\theta}_T, 1, \theta_D\big)$ follows from assuming $\theta_D > \tilde{\theta}_D$ (see the proof for Proposition 1).
- Continuity trivially holds.

The unique threshold claim for $\tilde{r}'$ follows from $\frac{d^2 S^*}{d\theta_M dr} > 0$ (part a of Lemma A.2).

Part b. Showing that the conditions for the intermediate value theorem hold establishes the existence of at least one $\tilde{\theta}_T' \in \big(\tilde{\theta}_T, \overline{\theta}_T\big)$ such that if $\theta_D > \tilde{\theta}_D$ and $r > \tilde{r}'$, then $S^*\big(\underline{\theta}_M, \tilde{\theta}_T', r, \theta_D\big) = S^*\big(\overline{\theta}_M, \tilde{\theta}_T', r, \theta_D\big)$:

- $S^*\big(\underline{\theta}_M, \tilde{\theta}_T, r, \theta_D\big) > S^*\big(\overline{\theta}_M, \tilde{\theta}_T, r, \theta_D\big)$ simplifies to $q\big(\overline{\theta}_M, \theta_D\big) > q\big(\underline{\theta}_M, \theta_D\big)$, a true statement, because the two types of military exhibit the same repressive efficiency at these parameter values (see the definition of $\tilde{\theta}_T$ in the proof for part b of Lemma 4).

- $S^*\big(\underline{\theta}_M, \overline{\theta}_T, r, \theta_D\big) < S^*\big(\overline{\theta}_M, \overline{\theta}_T, r, \theta_D\big)$ follows from assuming $\theta_D > \tilde{\theta}_D$ and $r > \tilde{r}'$ (see the proof for part a).
- Continuity trivially holds.

The unique threshold claim for $\tilde{\theta}'_T$ follows from $\frac{d^2 S^*}{d\theta_M d\theta_T} > 0$ (part c of Lemma A.2). ■

Proof of Proposition 4. The equilibrium probability of a coup is:

$$Pr(coup) = \begin{cases} q\big(\underline{\theta}_M, \theta_D\big) \cdot p\big(\underline{\theta}_M, \theta_T\big) & \text{if } \theta_T < \tilde{\theta}'_T \\ q\big(\overline{\theta}_M, \theta_D\big) \cdot p\big(\overline{\theta}_M, \theta_T\big) & \text{if } \theta_T > \tilde{\theta}'_T \end{cases}$$

Assuming $\frac{\partial p}{\partial \theta_T} < 0$ implies that this function strictly decreases at all $\theta_T \in \big(0, \tilde{\theta}'_T\big) \cup \big(\tilde{\theta}'_T, \overline{\theta}_T\big)$. Lemma 2 implies that the function exhibits a discrete increase at $\theta_T = \tilde{\theta}'_T$. ■

Proof of Proposition 5, part a. Equation 3 simplifies to $q\big(\theta_M, \theta_D\big) \cdot p\big(\theta_M, \theta_T\big) \cdot F\Big(\omega_D - \omega_T\big(\theta_M, r\big)\Big)$. By assumption, $\frac{\partial q}{\partial \theta_D} < 0$ and $\lim\limits_{\theta_D \to \overline{\theta}_D} q\big(\theta_M, \theta_D\big) = 0$, which establishes the claim.

Part b. Follows because the dictator chooses the personalist military if $E^*\big(\underline{\theta}_M, \theta_T, r\big) > E^*\big(\overline{\theta}_M, \theta_T, r\big)$, and θ_D does not affect this inequality. ■

B Proofs for Extensions

B.1 Probabilistic Repression Success

To simplify the exposition, the baseline model assumed that the military knew whether it was effective at repression (wins with probability 1) or ineffective (wins with probability 0) when making its choice. If instead the military faces the same source of uncertainty as the dictator at the military choice stage, then one aspect of the military's calculus changes. Specifically, if the military defends the regime, then it succeeds with probability $p(\theta_M, \theta_T)$ and the military consumes $\omega_D - \mu$, and with complementary probability repression fails and the military consumes $-\mu$. To highlight the main difference that arises with this alteration, I focus only on repressive efficiency here (i.e., examining the military's choice between repression and negotiated transition), which now equals:

$$E_p^*(\theta_M, \theta_T, r) \equiv \underbrace{p(\theta_M, \theta_T)}_{\text{Pr(repression succeeds)}} \cdot \underbrace{F\Big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T\big(\theta_M, r\big)\Big)}_{\text{Pr(defend regime)}}, \tag{B.1}$$

where the subscript p in E_p^* expresses probabilistic repression success. Equation B.1 differs from Equation 1 in one way: the possibility that repression can fail affects the military's probability of defending the regime. This term now equals $F\Big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T\big(\theta_M, r\big)\Big)$, as opposed to $F\Big(\omega_D - \omega_T\big(\theta_M, r\big)\Big)$ in the baseline model.

The key difference is the possibility that $F\Big(p(\overline{\theta}_M, \theta_T) \cdot \omega_D - \omega_T\big(\overline{\theta}_M, r\big)\Big) > F\Big(p(\underline{\theta}_M, \theta_T) \cdot \omega_D - \omega_T\big(\underline{\theta}_M, r\big)\Big)$, whereas in the baseline model the personalist military was more likely to defend the regime (conditional on effective repression) because of its lower reservation value to outsider rule. However, with the extension, the professional military's higher probability of winning increases its incentives to defend the regime relative to the personalist military. However, despite this difference, Appendix Section **??** shows that the overall logic is similar to that in Lemma 4. The only additional required assumptions are that the cross-partials are large in magnitude, which ensures that the direct effects that drive Lemma 4 are larger in magnitude than the indirect effects created by assuming the military is uncertain if repression will succeed.

Under the extension in which the military knows the probability with which repression succeeds but not the outcome of the Nature draw, a formal result identical in structure to Lemma 4 holds under the following assumptions about two of the cross-partials (for both, the magnitude of complementarities for the direct effects to dominate the indirect effects). Lemma A.2 shows that these assumptions generate an identical statement as Lemma A.1.

Assumption B.1. *The proof for Lemma B.1 defines the following thresholds.*

Part a.
$$-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} > \overline{\partial^2 \omega_T}$$

Part b.
$$-\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} > \overline{\partial^2 p}$$

Lemma B.1. *For E_p^* defined in Equation B.1:*

Part a.
$$\frac{d^2 E_p^*}{d\theta_M dr} > 0$$

Part b.

$$\frac{d^2 E_p^*}{d\theta_M d\theta_T} > 0$$

Proof. The structure of the proof is identical to that for Lemma A.1. The terms in blue are the additional terms that arise from probabilistic repression success. The first derivative is:

$$\frac{dE_p^*}{d\theta_M} = \overbrace{\underbrace{\frac{\partial p}{\partial \theta_M} \cdot F\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big)}_{(+)\uparrow \text{Pr(repression succeeds)}}}^{1}$$

$$\overbrace{\underbrace{-p(\theta_M, \theta_T) \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \left[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\right]}_{(-)\downarrow \text{Pr(defend regime) if term in brackets} > 0}}^{2} >< 0$$

Part a.

$$\frac{d^2 E_p^*}{d\theta_M dr} = \underbrace{\frac{\partial p}{\partial \theta_M} \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \left(-\frac{\partial \omega_T}{\partial r}\right)}_{(+)\uparrow \text{ magnitude of } 1 \text{ by } \uparrow \text{Pr(defend regime)}}$$

$$\underbrace{+p(\theta_M, \theta_T) \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \left(-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r}\right)}_{(+)\downarrow \text{ magnitude of } 2 \text{ by } \downarrow \text{ effect of } \theta_M \text{ on } \omega_T}$$

$$\underbrace{+p(\theta_M, \theta_T) \cdot \left[-f'\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big)\right] \cdot \left(-\frac{\partial \omega_T}{\partial r}\right) \cdot \left[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\right]}_{(+)\downarrow \text{ magnitude of } 2 \text{ by } \uparrow \text{Pr(defend regime) if term in brackets} > 0} >< 0$$

Eliding the terms in brackets, the overall term is strictly positive if and only if:

$$-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} > \overline{\partial^2 \omega_T} \equiv \left\{\frac{\partial p}{\partial \theta_M} \cdot f(\cdot) \cdot \left(-\frac{\partial \omega_T}{\partial r}\right) + p \cdot \left[-f'(\cdot)\right] \cdot \left(-\frac{\partial \omega_T}{\partial r}\right) \cdot \left[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\right]\right\} \cdot \frac{1}{p \cdot f(\cdot)},$$

which part a of Assumption B.1 assumes is true.

Part b.

$$\frac{d^2 E_p^*}{d\theta_M d\theta_T} = \underbrace{\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} \cdot F\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big)}_{(+)\uparrow \text{ magnitude of } 1 \text{ by } \uparrow \text{ effect of } \theta_M \text{ on Pr(repression succeeds)}}$$

$$\underbrace{+\left(-\frac{\partial p}{\partial \theta_T}\right) \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \left[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\right]}_{(+)\downarrow \text{ magnitude of } 2 \text{ by } \downarrow \text{Pr(repression succeeds) if term in brackets} > 0}$$

$$\underbrace{-\frac{\partial p}{\partial \theta_M} \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \Big(-\frac{\partial p}{\partial \theta_T}\Big) \cdot \omega_D}_{\text{(–) }\downarrow\text{ magnitude of (1) b/c diminish Pr(defend)}}$$

$$\underbrace{+\,p(\theta_M, \theta_T) \cdot f\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big) \cdot \frac{\partial^2 p}{\partial \theta_M \partial \theta_T} \cdot \omega_D}_{\text{(+) }\downarrow\text{ magnitude of (2) because }\uparrow\text{ effect of }\theta_M\text{ on Pr(defend)}}$$

$$\underbrace{-\,p(\theta_M, \theta_T) \cdot \Big[-f'\big(p(\theta_M, \theta_T) \cdot \omega_D - \omega_T(\theta_M, r)\big)\Big] \cdot \Big(-\frac{\partial p}{\partial \theta_T}\Big) \cdot \omega_D \cdot \Big[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\Big]}_{\text{(–) }\uparrow\text{ magnitude of (2) by }\uparrow\text{ Pr(defend regime) if term in brackets} > 0} >< 0$$

Eliding the terms in parentheses, the overall term is strictly positive if and only if:

$$\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} > \overline{\partial^2 p} \equiv$$

$$\Bigg\{\Big(-\frac{\partial p}{\partial \theta_T}\Big) \cdot \Big[\frac{\partial \omega_T}{\partial \theta_M} - \frac{\partial p}{\partial \theta_M} \cdot \omega_D\Big] \cdot \Big[f(\cdot) - p \cdot \big[-f'(\cdot)\big] \cdot \omega_D\Big] - \frac{\partial p}{\partial \theta_M} \cdot f(\cdot) \cdot \Big(-\frac{\partial p}{\partial \theta_T}\Big) \cdot \omega_D\Big]\Bigg\} \cdot \frac{1}{F(\cdot) + p \cdot f(\cdot) \cdot \omega_D},$$

which part b of Assumption B.1 assumes is true.

■

How do the expressions in the proof for Lemma A.2 differ from those in the proof for Lemma A.1? To explain the differences, the following copy and pastes the text that follows the proof of Lemma A.1 in black, and the blue text comments on the differences in Lemma A.2. To avoid repetition, I do not comment on the change that arises within every $F(\cdot)$, $f(\cdot)$, and $f'(\cdot)$ term because ω_D is multiplied by $p(\theta_M, \theta_T)$.

The first derivative shows the two countervailing effects of an increase in θ_M on equilibrium repressive efficiency. Mechanism (1) is positive because higher θ_M raises the probability that the military can repress effectively. This term is unchanged, although is now phrased as the probability that the military succeeds at repression. Mechanism (2) is negative because higher θ_M decreases the probability that the military defends the regime conditional on effective repression, which follows from $\frac{\partial \omega_T}{\partial \theta_M} > 0$. This mechanism no longer requires the qualifying statement about effective repression. More important, this mechanism is not necessarily negative because of an additional effect of θ_M on the military's probability of defending the regime: θ_M increases the probability that repression succeeds, which increases the military's incentive to defend the regime. Mechanism (2) is negative if and only if:

$$\frac{\partial \omega_T}{\partial \theta_M} > \frac{\partial p}{\partial \theta_M} \cdot \omega_D. \tag{B.2}$$

If Equation B.2 does not hold, then the professional military's higher probability of winning dominates the personalist military's lower value to outsider rule to yield a higher probability of defending the incumbent for professional militaries.

The effects encompassed in the second derivatives are:

- **Part a.** An increase in r increases the magnitude of $\frac{dE^*}{d\theta_M}$ if that term is positive, and decreases its magnitude if it negative, through three effects:
  - Increases the magnitude of mechanism (1) by increasing the probability that the military defends the regime conditional on effective repression because $\frac{\partial \omega_T}{\partial r} < 0$. The sign of this term is unchanged, although does not require the phrase about effective repression.
  - Decreases the magnitude of mechanism (2) by decreasing the magnitude of the positive effect of θ_M on ω_T because $\frac{\partial^2 \omega_T}{\partial \theta_M \partial r} < 0$. Unchanged.
  - Decreases the magnitude of mechanism (2) by increasing the probability that the military defends the regime conditional on effective repression because $\frac{\partial \omega_T}{\partial r} < 0$. This mechanism no longer requires the qualifying statement about effective repression. More important, this effect is positive if Equation B.2 holds, and negative otherwise. In the latter case, $-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r}$ must be large enough in magnitude for the overall derivative in part a to be positive. $\big($Alternatively, the statement in part a is true without imposing an assumption about the magnitude of $-\frac{\partial^2 \omega_T}{\partial \theta_M \partial r}$ if $f'(\cdot) = 0$ which, for example, the uniform distribution satisfies.$\big)$
- **Part b.** An increase in θ_T increases the magnitude of $\frac{dE^*}{d\theta_M}$ if that term is positive, and decreases its magnitude if it negative, through two effects:
  - Increases the magnitude of mechanism (1) by increasing the magnitude of the positive effect of θ_M on the probability the military can repress effectively because $\frac{\partial^2 p}{\partial \theta_M \partial \theta_T} > 0$. This term is unchanged, although is now phrased as the probability that the military succeeds at repression.
  - Decreases the magnitude of mechanism (2) by decreasing the probability the military can repress effectively because $\frac{\partial p}{\partial \theta_T} < 0$. This mechanism no longer requires the qualifying statement about effective repression. More important, this effect is positive if Equation B.2 holds and negative otherwise. In the latter case, $\frac{\partial^2 p}{\partial \theta_M \partial \theta_T}$ must be large enough in magnitude for the overall derivative in part b to be positive. The intuition for the countervailing effect is as follows. If Equation B.2 does not hold, then mechanism (2) is positive. In this case, a decrease in the probability that repression succeeds caused by higher θ_T diminishes the magnitude of a positive effect on repressive efficiency, hence the negative sign.
  - Three additional expressions (lines 3 through 5 in the proof for part b) arise from assuming probabilistic repression success.

B.2 CONTINUOUS MILITARY CHOICE

From Equation A.1, we can calculate:

$$\frac{d^2S^*}{d\theta_M^2} = -2\frac{\partial q}{\partial\theta_M}\frac{dE^*}{d\theta_M} + [1-q(\theta_M,\theta_D)]\frac{d^2E^*}{d\theta_M^2} - \frac{\partial^2 q}{\partial\theta_M^2}E^* \tag{B.3}$$

$$\begin{aligned}\frac{d^2E^*}{d\theta_M^2} &= \frac{\partial^2 p}{\partial\theta_M^2}F\big(\omega_D-\omega_r(\theta_M,r)\big) - 2\frac{\partial p}{\partial\theta_M}f\big(\omega_D-\omega_T(\theta_M,r)\big)\frac{\partial\omega_T}{\partial\theta_M}\\ &+ p(\theta_M,\theta_T)\left[f'(\cdot)\big(\frac{\partial\omega_T}{\partial\theta_M}\big)^2 + f(\cdot)\frac{\partial^2\omega_T}{\partial\theta_M^2}\right]\end{aligned}$$

Substituting E^*, $\frac{dE^*}{d\theta_M}$, and $\frac{d^2E^*}{d\theta_M^2}$ into Equation B.3 yields:

$$\begin{aligned}\frac{d^2S^*}{d\theta_M^2} &= -2\frac{\partial q}{\partial\theta_M}\frac{\partial p}{\partial\theta_M}F(\cdot) + 2f(\cdot)\frac{\partial\omega_T}{\partial\theta_M}\left[\frac{\partial q}{\partial\theta_M}p(\theta_M,\theta_T) - \frac{\partial p}{\partial\theta_M}[1-q(\theta_M,\theta_D)]\right]\\ &+ F(\cdot)\left[\frac{\partial^2 p}{\partial\theta_M^2}[1-q(\theta_M,\theta_D)] - \frac{\partial^2 q}{\partial\theta_M^2}p(\theta_M,\theta_T)\right]\\ &+ [1-q(\theta_M,\theta_D)]p(\theta_M,\theta_T)\left[f'(\cdot)\big(\frac{\partial\omega_T}{\partial\theta_M}\big)^2 + f(\cdot)\frac{\partial^2\omega_T}{\partial\theta_M^2}\right].\end{aligned}$$

With the assumptions that $\mu \sim U[0,1-\omega_D]$, and $p(\theta_M,\theta_T)$, $q(\theta_M,\theta_D)$ and $\omega_T(\theta_M,r)$ are linear in θ_M, it reduces to

$$\frac{d^2S^*}{d\theta_M^2} = -2\frac{\partial q}{\partial\theta_M}\frac{\partial p}{\partial\theta_M}F(\cdot) + 2f(\cdot)\frac{\partial\omega_T}{\partial\theta_M}\left[\frac{\partial q}{\partial\theta_M}p(\theta_M,\theta_T) - \frac{\partial p}{\partial\theta_M}[1-q(\theta_M,\theta_D)]\right].$$

The overall term is strictly negative if and only if:

$$\frac{F\big(\omega_D-\omega_r(\theta_M,r)\big)}{f\big(\omega_D-\omega_r(\theta_M,r)\big)} > \frac{\frac{\partial\omega_T}{\partial\theta_M}\left[\frac{\partial q}{\partial\theta_M}p - \frac{\partial p}{\partial\theta_M}(1-q)\right]}{\frac{\partial q}{\partial\theta_M}\frac{\partial q}{\partial\theta_M}}.$$

Substituting in the functional form assumptions yields:

$$\begin{aligned}\omega_D\left[1-(1-r)\frac{\theta_M}{\overline{\theta}_M}\right] &> \omega_D(1-r)\frac{\theta_M}{\overline{\theta}_M}\left[\frac{1-\theta_T(1-\theta_M)}{\theta_T} - \frac{1-(1-\theta_D)\frac{\theta_M}{\overline{\theta}_M}}{(1-\theta_D)/\overline{\theta}_M}\right]\\ \iff 1 &> (1-r)\frac{\theta_M}{\overline{\theta}_M}\left[\frac{1}{\theta_T} - \frac{\overline{\theta}_M}{1-\theta_D} + 2\theta_M\right].\end{aligned}$$

If $r > \frac{1}{2}$, and $\overline{\theta}_M > \frac{1-\theta_D}{\theta_T}$, the RHS is $(1-r)\frac{\theta_M}{\overline{\theta}_M}2\theta_M + (1-r)\frac{\theta_M}{\overline{\theta}_M}\left[\frac{1}{\theta_T} - \frac{\overline{\theta}_M}{1-\theta_D}\right]$. Because $\theta_M < \overline{\theta}_M < 1$, the first term is strictly smaller than 1 and the second is strictly negative for all $\theta_M \in (0,\overline{\theta}_M)$, yielding the claim.

B.3 INHERENT LOYALTY

Figure B.1: Game Tree for Inherent Loyalty Extension

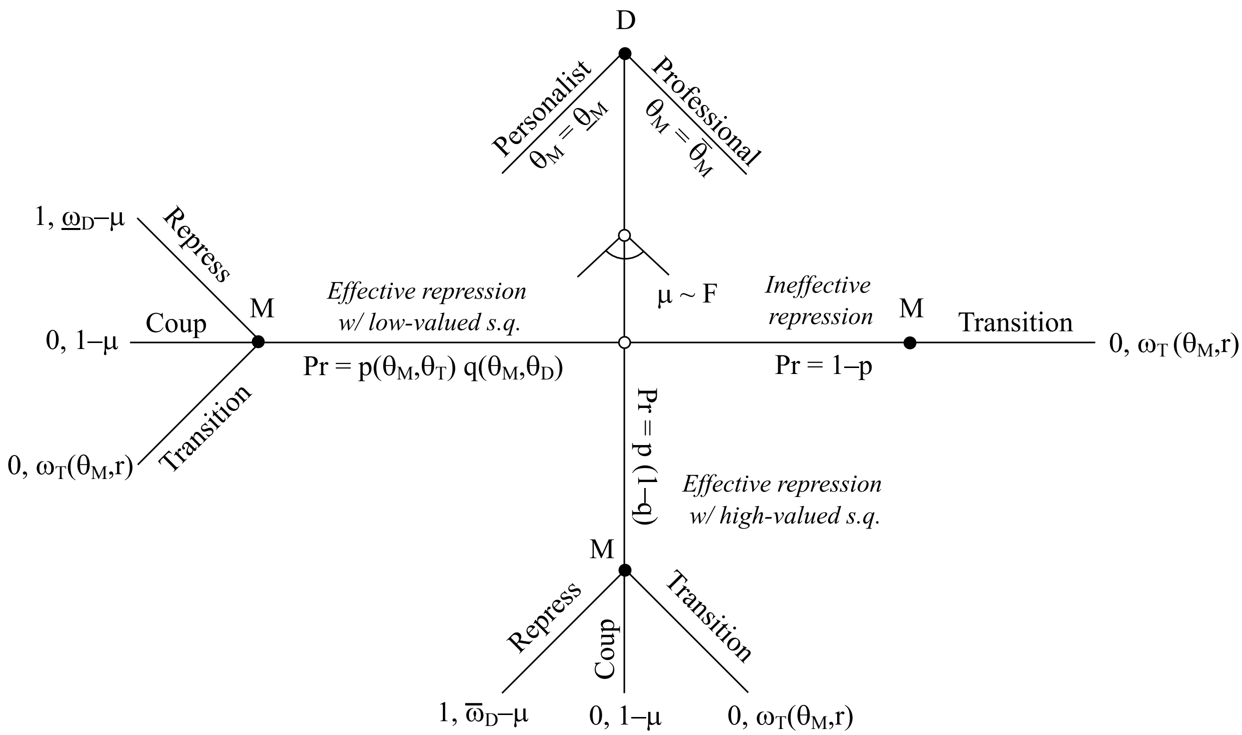


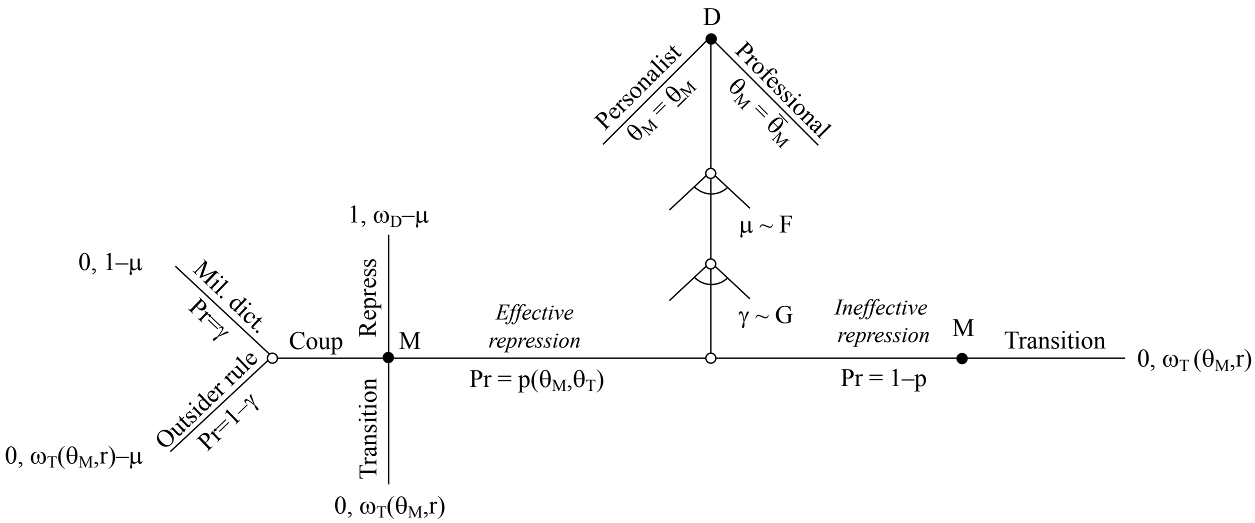
Table B.1 is identical to Table 3 except it changes the description of the columns to correspond with the inherent loyalty extension.

Table B.1: Military's Optimal Choice with Inherent Loyalty

	Low value s.q. dictator Pr=$q(\theta_M, \theta_D)$	**High value s.q. dictator** Pr=$1 - q(\theta_M, \theta_D)$
Repression is effective Pr=$p(\theta_M, \theta_T)$	Coup	Repress if μ is low Transition if μ is medium
Ineffective Pr=$1 - p(\theta_M, \theta_T)$	Transition	Transition

B.4 Strategic Loyalty

Figure B.2: Game Tree for Strategic Loyalty Extension



Proposition B.1 formalizes the discussion from the text regarding the conditions under which the military prefers defending the regime over attempting a coup.

Proposition B.1 (Strategic loyalty mechanism)**.** *The coup component of the dictator's survival objective function,* $G\left(\frac{\omega_D - \omega_T(\theta_M, r)}{1-\omega_T(\theta_M, r)}\right)$ *in Equation 5, strictly decreases in* θ_M *through the effect of* θ_M *on* ω_T*.*

Proof. Expressing $G\left(\frac{\omega_D - \omega_T(\theta_M, r)}{1-\omega_T(\theta_M, r)}\right)$ as G:

$$\frac{dG}{d\theta_M} = \frac{\partial G}{\partial \theta_M} + \frac{\partial G}{\partial \omega_T} \cdot \frac{d\omega_T}{d\theta_M}$$

$$\frac{\partial G}{\partial \theta_M} = 0$$

$$\frac{\partial G}{\partial \omega_T} = -\frac{1-\omega_D}{(1-\omega_T)^2}$$

$$\frac{d\omega_T}{d\theta_M} > 0 \text{ by assumption}$$

This implies that:

$$\frac{\partial G}{\partial \omega_T} \cdot \frac{d\omega_T}{d\theta_M} < 0$$

■

Unlike in the baseline setup, the coup term in the dictator's objective function for the strategic loyalty setup,

$G\Big(\frac{\omega_D-\omega_T(\theta_M,r)}{1-\omega_T(\theta_M,r)}\Big)$, does not equal the equilibrium probability of a coup attempt. For low enough q, the military prefers a negotiated transition to a coup for any draw of μ. This creates the possibility that the military prefers negotiated transition to a coup for parameter values in which the military strictly prefers a coup to repression, which is not possible in the baseline model. This consideration is irrelevant for the dictator's objective function—conditional on the military choosing not to repress, its coup/transition choice does not affect the dictator's consumption—but does affect the equilibrium probability of a coup attempt. Instead, this probability equals:

$$\underbrace{\int_0^{\omega_D-\omega_T} \overbrace{\int_{\frac{\omega_D-\omega_T}{1-\omega_T}}^{1} dG(q)}^{\text{Prefers coup to repression}} \cdot dF(\mu)}_{\text{Prefers repression to transition}} + \underbrace{\int_{\omega_D-\omega_T}^{\overline{\mu}} \overbrace{\int_{\frac{\mu}{1-\omega_T}}^{1} dG(q)}^{\text{Prefers coup to transition}} \cdot dF(\mu)}_{\text{Prefers transition to repression}}$$

The outer integral for each term expresses the probability that the military prefers repression to transitioning or vice versa, and the inner integral expresses the probability that the military prefers a coup to the most-preferred alternative. The range of the outer integrals is the same as in the baseline model: the military prefers repression to transition if $\mu \in \big(0, \omega_D - \omega_T\big)$, and prefers transition to repression if $\mu \in \big(\omega_D - \omega_T, \overline{\mu}\big)$. The range of the inner integral in the first term expresses that the military prefers a coup over repression if $q \in \big(\frac{\omega_D-\omega_T}{1-\omega_T}, 1\big)$, which follows from the discussion in the text. The range of the inner integral in the second term expresses that the military prefers a coup over transition if $q \in \big(\frac{\mu}{1-\omega_T}, 1\big)$, which follows from solving $q + (1-q)\cdot\omega_T - \mu > \omega_T$ for μ. The entire expression simplifies to:

$$\left[1 - G\bigg(\frac{\omega_D-\omega_T}{1-\omega_T}\bigg)\right] \cdot F\big(\omega_D - \omega_T\big) + \int_{\omega_D-\omega_T}^{\overline{\mu}} \left[1 - G\bigg(\frac{\mu}{1-\omega_T}\bigg)\right] \cdot dF(\mu)$$

B.5 Gambling for Resurrection

Figure B.3: Game Tree for Gambling for Resurrection Extension