# Functionaries of Repression: Autocratic Control through Bureaucratic Supervision in Russia*

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**Abstract**

How do bureaucrats outside the security apparatus make decisions to repress? Governments use bureaucrats to administer repressive policies such as protest authorization, unequal service delivery, and identification management. When deciding whether to repress, bureaucrats who report to the central government consider more than their incentive contracts. We present a delegation model with a principal preferring social order and a bureaucratic agent considering the punishment for defiance. Functionaries who have goal conflict with the regime will defy orders and allow antigovernment protests when there are opportunities to hide defiance behind ungovernable protests. Such bureaucrats do so more frequently when they have informational advantages, but less competent functionaries do so when the threat of punishment is not too high. A statistical analysis of instances of bureaucratic repression in Russia across 2017-2018 provides support for our claims. The findings have implications for research on bureaucrats as agents of repression and authoritarian politics.

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# 1. INTRODUCTION

Authoritarian regimes delegate repression to actors within and outside of the security apparatus. Security agents violate the physical integrity rights of civilians using tactics such as arrests, torture, and killings. Each year, local politicians, program officers, bureaucrats, and ministry staff, whom we term administrative bureaucrats or bureaucratic agents, also repress civilians around the world using tactics that do not involve the use of violence. They implement programs and regulations differentially to reduce civilians' ability to participate in politics, prevent groups from protesting lawfully, and create procedural barriers to voting or running for office. Actors outside the security apparatus, described here as administrative bureaucrats, are at the forefront of 21st-century repression.[1]

How do administrative bureaucrats decide whether to comply with autocratic orders to repress? How do autocrats incentivize administrative bureaucrats to repress? Research in conflict and comparative politics focuses primarily on security agents as repressive agents. Studies find that security actors obey orders to repress because they have chosen a profession that represses (Scharpf and Gläßel 2020), because their training teaches them to easily violate physical rights (Hoover Green 2018), in order to develop intragroup cohesion (Cohen 2016), or in order to secure personal gains from repression (Butler, Gluch, and Mitchell 2007). These motivators do not translate well when explaining the decision-making of *administrative bureaucratic agents* in the repressive process. Administrative bureaucrats often join the public service or run for office expecting to serve local communities and uphold human rights, do not have formal authority or training to repress, and usually do not receive intrinsic personal gain from implementing repression.[2] Administrative bureaucrats

1. Throughout this article, we distinguish between two types of repressive agents: administrators and politicians on the one hand, whom we term administrative bureaucrats or bureaucratic agents, and police, secret police, or military (security agents) on the other. We acknowledge that police and military are also considered street-level bureaucrats (Lipsky 1980; Curtice 2023), but for the purposes of this article, we do not label them as bureaucrats.

2. If they receive money or personal benefits from their actions, we would consider this corruption. Repression occurs when the implementation serves to diminish civilians' ability to participate in politics.

ordered to ban protests, to authorize politically motivated layoffs or student expulsions, or to withhold social payments to a group because of their perceived political threat to the regime could experience a moral dilemma and even a sense of outrage.

To explain bureaucratic repression, we draw on scholarship on bureaucratic compliance. Public administration research identifies explanations as to why bureaucrats comply with a supervisor's directives, which we incorporate into a formal delegation model of autocratic repression. In our theory, an autocratic regime delegates a repressive order to an administrative bureaucrat along with an incentive contract of promised punishment to motivate compliance (Gehlbach 2021, ch. 5). Some bureaucrats align with the government's preferences or mission to repress, while others experience conflict with the specific orders (Wilson 1989). Goal conflict can arise from ideological differences with the regime or from the need to respond to constituents. Furthermore, some bureaucrats have more expertise and access to information than the principal when it comes to the nature of a political threat. For example, some protests are not responsive to bureaucratic repression and therefore cannot be controlled with the tactics available to the bureaucrat. We describe these protests as ungovernable. Some agents have information advantages on which protests are ungovernable, advantages that make them more effective in working with or repressing their constituents (Hassan 2020; Curtice 2023), but also create the opportunity for agents to defy orders (Egorov and Sonin 2011; Gailmard and Patty 2012; Dragu and Przeworski 2019). Bureaucrats attempt to avoid punishment and thread the needle between their own political preferences over policy and protests and those of the central government, which retains the bureaucrats in positions of power. The regime then carries out the threatened punishment based on the opposition behaviors it observes under the bureaucrat's jurisdiction.

The model of bureaucratic compliance, applied newly to the study of administrative repression, yields novel implications for when bureaucrats will repress. Furthermore, we add the concept of ungovernable protests to the theory, which is largely absent from models

of government repression. This helps us capture both the nature of resolute opponents (Ritter and Conrad 2016) and bureaucratic expertise (Gailmard and Patty 2012) in a theory to explain administrative repression.

Incentives to avoid punishment, the possibility of ungovernable protests, information asymmetries between the autocrat and bureaucrats, and expectations of other bureaucrats' behavior shape the practice of bureaucratic repression. Loyal bureaucrats – those whose preferences about political threats align with the preferences of the autocrat – will follow a repressive order whether or not it successfully prevents opposition and whether or not they have relative expertise in a locality. A disloyal bureaucrat who has no informational advantage will often follow a repressive policy to avoid punishment but will sometimes choose defiant actions to allow protest when the regime expects ungovernable protest to occur.

We identify when a bureaucrat will defy an order to repress. Because some ungovernable dissent actions may occur even when a bureaucrat represses, and because the likelihood of that unavoidable dissent is variable, a competent, disloyal bureaucrat can allow some dissent against the autocrat's orders without facing punishment. Here, we emphasize the importance of the principal's and agent's beliefs about all of the bureaucrats in the state system. The more likely it is that the average bureaucrat is loyal, the more willing a disloyal bureaucrat will be to defy the order to repress. This is because they can hide their defiance under random protest shocks, as long as the regime believes that competent disloyal bureaucrats are rare. Furthermore, when a protest beyond the control of any agent is very likely to occur across the country, disloyal bureaucrats are more likely to disobey orders to repress, and at the same time are more likely to avoid punishment. An autocrat will be more tolerant of dissent as the probability of unavoidable dissent increases. As ungovernable protest becomes more likely, more loyal bureaucrats will experience protest despite following orders, so a hard line from the autocrat would punish valuable loyal bureaucrats. Widespread protest outbreaks protect bureaucrats from punishment.

Our theory also provides insights as to when an autocratic regime will rule with a tight fist, threatening punishment under very restrictive rules for protest, versus a lighter hand that allows some protest in jurisdictions without punishing the bureaucrat in charge. A regime will prefer a more restrictive punishment rule when it expects the average bureaucrat to be disloyal or to have an informational advantage relative to the regime. It prefers a more lenient rule when it expects widespread shocks to protest outcomes, because the bureaucrat is likely to be loyal and still experience protest, but it prefers restriction when it expects the ungovernable protest to be large or severe in a given jurisdiction, to ensure the bureaucrat's best efforts to repress it. These implications are new and compelling explanations of bureaucratic choice and autocratic repression, and they support the theoretical expectations of bureaucrat repressive behavior in equilibrium, although we do not directly assess the implications for autocratic control empirically.

We evaluate the model's implications for the bureaucratic choice to comply with orders to repress in the empirical context of contemporary Russia. The Kremlin delegates some repression to the police and security apparatus who repress using violence, and other repression to administrative bureaucrats who repress using administrative means. Our focus is on Russian governors, who head the executive branch in their jurisdiction and are at the top of the delegation chain of repression. The Kremlin holds governors accountable for the protests that result from the performance of their subordinates. Although we are not the first to describe elected officials as bureaucrats (see, for example, Bozcaga 2020), we acknowledge that elected governors are also principals in their position and not just agents. We treat accountability to the local population as an incentive which may drive preferences between governors and the Kremlin to diverge. Yet, we note that in authoritarian contexts, elected officials remain primarily accountable to the executive and, importantly, can be and are directly punished or purged by the autocrat for protest outcomes in their jurisdiction. For the empirical analysis, we collected information on governors' political affiliations and career trajectories to predict (i) monthly instances of bureaucratic repression against mem-

bers of Russia's most prominent opposition group, Team Navalny, from January 2017 to March 2018 and (ii) denials of protest permits during three days of national protests in 2017. Protest authorization requirements are integral to the repression of protests in Russia and many other countries. Authorities tasked with authorizing protests use the process to identify potentially threatening actions and discriminate against groups for the content of their speech. Protest authorization requirements are increasingly used to dampen activists' ability to mobilize and justify their arrest. Additional counts of authorized and unauthorized protests that span a longer period complement the analysis.

Our primary contribution is the study of administrative bureaucrats as agents of repression. Our formal theory provides insight into bureaucratic decision-making in the context of repression. In focusing on punishment and direct control as the incentive for administrative bureaucrats to comply with orders, we primarily add to the canon on autocratic repression, but the insights of our research are not limited to authoritarian regimes. Concerns about demotion or severance may motivate bureaucratic behavior even in democracies. Like other research, we assume that autocrats prefer to retain a competent and loyal bureaucrat in powerful positions in each region because this type of bureaucrat will be predisposed to follow a repressive policy or order to minimize protest (Lorentzen 2013; Hassan 2020).

Tight control over outcomes is a hallmark of authoritarian regimes, yet some administrative agents defy orders. We identify the contexts in which a bureaucrat will leverage information asymmetry to resist an autocrat's orders. Only a competent bureaucrat can do so due to their informational advantage, while even a disloyal bureaucrat will repress if they are incompetent. This finding differs from the scholarship on bureaucracy focused on corruption and clientelism, where a bureaucrat administers policies to advance their personal enrichment or the benefit of their political party (Brierley 2020; Dasgupta and Kapur 2020). In our context, the bureaucrat implements discrimination to comply with repressive orders not just out of loyalty to the regime but also to avoid punishment. The bureaucrat

in our model who would prefer not to repress still does so under several conditions in the authoritarian context due to fear of punishment.

The theory improves our understanding of how autocratic regimes manipulate bureaucrats' incentives to comply with repressive orders. We argue that autocrats set expectations as to how much dissent they will tolerate before punishing bureaucrats, and the expectations are less tolerant when it is on average more likely that a bureaucrat is disloyal. Interestingly, the model implies that the regime will be more lenient to bureaucrats when there is a high expected likelihood of coordinated, ungovernable protest efforts across multiple localities, because the outcome is likely to be out of the bureaucrats' control and punishment risks firing competent loyal agents. Autocrats sacrifice perfect repression to ensure that they retain a significant pool of loyal bureaucrats. The introduction of some protests that are not responsive to administrative repression alone is an important element in understanding when an agent must obey or will defy an autocrat's orders.

Although our theory can explain bureaucratic contributions to both preventive and responsive repression, our empirical analysis, through the study of Russian protest permits, contributes to the study of preventive repression, both when it is likely to occur and how it is carried out. Globally, administrative bureaucrats repress by denying permits and taking deterrent programmatic actions in anticipation of dissent, attempting to dissipate protests before organizers and participants mobilize. With exceptions (e.g., Ritter and Conrad 2016; Truex 2019; Tertytchnaya 2023), the scholarship on political violence and human rights focuses more often on responsive repression, which occurs after dissent is observed. As Dragu and Lupu (2021) remind us, shifting our attention toward preventive repression, which often involves less violent abuses than reactive repression, is crucial to evaluating the future of human rights and authoritarian rule. The character of the repressive action we study in this paper, protest permit denials, is also nonviolent. Nonviolent strategies of repression have received less attention than strategies of repression that involve the use of

brutal force and coercion (e.g., Earl, Maher, and Pan 2022). Our research contributes to the study of all types of political control, not just those that threaten or enact violence (Hassan, Mattingly, and Nugent 2022; Earl and Braithwaite 2022).

# 2. A Model of Bureaucratic Repression

## 2.1. Specification

We build a delegation model that has two strategic players: an autocratic regime ($A$, using the pronoun it) operating as the principal and a bureaucrat ($B$, using the pronouns they/them) acting as an agent.[3] We conceptualize the autocratic regime $A$ as the national executive and direct advisors, where the executive agents and agencies are distinct and modeled as bureaucrats $B$. Administrative bureaucrats, as defined in this work, can be elected or appointed, such as unit executives, supervisors, or street-level bureaucrats (Lipsky 1980; Wilson 1989). The empirical analysis in this article focuses on unit executives or supervisors who are accountable to and can be removed by the central government.

$A$ and $B$ make decisions that affect their respective constituencies (which overlap). Those constituencies, including potential protesters, are not strategic actors here, and we make no assumptions about the broader constituencies' support for or opposition to the central regime. This allows us to focus on bureaucratic decision-making in response to the regime's incentives. Nevertheless, we assume there is opposition of some type in a bureaucrat's jurisdiction that the regime perceives as a threat and wants to repress; the repressive policy is intended to control this opposition in all jurisdictions in the country. We represent the amount of collective protest that will occur in a bureaucrat's jurisdiction (the outcome) as a point on a real number line $x \in [0, \infty)$; this number is zero or positive, so that an increase in $x$ represents a larger number of realized protests.

3. The model is similar to that of others studying bureaucracy and task implementation in both democratic and autocratic contexts. See, for example, Epstein and O'Halloran (1999), Huber and Shipan (2002), and Gailmard and Patty (2012), and Gehlbach (2021, Ch. 5).

The autocratic regime prefers that there be as little protest as possible, so its ideal point is the outcome $x_A = 0$.[4] As the amount of protest increases, the regime is worse off, so its utility function for a given protest result is $u_A(x) = -(x-0)^2$. The regime cannot repress protests directly, so it delegates the enforcement of its preferred outcome to the bureaucrat. The bureaucrats are numerous, expanding the regime's reach into all corners of the country. They often have greater familiarity and experience with the politics of their region than the central regime, due to the time they have worked in their position (Hassan 2020; Brierley 2020) or their social connections with the communities they govern (Tsai 2007; Bhavnani and Lee 2018; Curtice 2023). This relative expertise is one of the key reasons why principals delegate tasks to agents, but it creates information asymmetry and the potential for moral hazard behaviors (Gailmard and Patty 2012; Gehlbach 2021).

The bureaucrat, who can be any type of bureaucrat from a governor (executive agent or bureaucratic supervisor) to a local administrator (street-level agent), has an ideal point $x_B \geq 0$, representing their preference divergence from the principal. Policy outcomes are influenced by protest through channels over which the bureaucrat does not have direct control, and the bureaucrat may have different policy preferences than the autocrat. When this is the case, $x_B$ is non-zero. As $x_B$ increases, the bureaucrat is less aligned with the regime's preferences and more aligned with the policy preferences of the people attempting to protest. The utility of the bureaucrat decreases as the protest outcome moves positively or negatively away from its ideal point: $u_B = -(x - x_B)^2$. We define $B$ as loyal or disloyal to the regime as a function of the distance between $x_A$ and $x_B$ without loss of generality.

**Definition 1.** *Denote a bureaucrat as loyal ($B_L$) if their preference for observed protest is $x_B = 0$ and disloyal ($B_D$) if $x_B = \epsilon$.*

**Definition 2.** *Denote the probability that a bureaucrat is disloyal ($x_B = \epsilon$) as $\gamma$.*

4. This assumption captures the regime's preference to deny more permit applications than a disloyal bureaucrat; it should not be interpreted as an absolute preference. By normalizing the most preferred outcome of the regime to $x = 0$, we simplify the calculations without loss of generality. The implications of our model are consistent as long as $0 \leq x_A \leq x_B$.

This structure makes the order to repress protests analogous to a traditional delegation model of policy implementation. The regime delegates the repressive procedure to the bureaucrat, stating its preference for a protest outcome of $x = 0$. $A$ authorizes the bureaucrat to make decisions on its behalf. The bureaucrat must select an action $a \in x$ that represents the amount of protest they will allow without repressing, where $a \in \{0, \epsilon\}$. The order includes an incentive contract which specifies the maximum amount of protest ($\rho \equiv \overline{x} \in \Re$) that the regime will allow in a given region before punishing the bureaucrat.

After the regime delegates decision making to the bureaucrat, a random protest shock $\omega \in \Re$ occurs. The shock is an exogenous occurrence that represents how much protest will occur that is outside a bureaucrat's ability to deter with the tactics available to them. We refer to a positive protest shock as *ungovernable protest*. This could be a coordinated action by a social movement to protest in every region on the same day, a major shift in a war or the economy that turns people against the regime, or protest groups who are sufficiently resolute that they protest regardless of repression. Simply put, ungovernable protest will not be prevented by the bureaucrat's governing actions.[5] Formally, we assume that the ungovernable protest shock takes one of two realizations, $\omega \in \{0, \epsilon\}$, where $\omega$ is realized as ungovernable protest ($\epsilon$) with probability $\theta$. The concept is relatively unexplored in models or repression, but it represents the relative informational advantage of the bureaucrat as modeled in standard delegation models, in that the bureaucrat can potentially observe $\omega$ but the autocratic regime cannot.

However, not all bureaucrats know what ungovernable protest will occur in their jurisdiction; they may be more or less attuned to opposition activities. We represent this information advantage as the bureaucrat's *competence*, which is a binary state of the world where a bureaucrat is competent ($B_C$, having sufficient expertise to know what ungovernable protest will occur) with exogenous probability $0 \leq \phi \leq 1$ and incompetent ($B_I$) with complementary probability. This specification sets up a moral hazard: Competent bureau-

5. It may instead be deterred or ended via security-enacted repression.

crats enjoy an informational advantage that can benefit the regime in the application of its preferred policies or benefit the disloyal bureaucrat in shirking repressive orders. But the regime does not perfectly know how loyal and competent the bureaucrat is or whether the random shock results in ungovernable protest and must draw inferences about the loyalty and competence of the bureaucrat from the observable protest in their jurisdiction.[6]

Once the bureaucrat observes the realization of $\omega$ (or not), they select $a^* \in \{0, \epsilon\}$. A smaller $a^*$ implies more repression, while a larger $a^*$ means the bureaucrat allows more (represses fewer) protests. A competent bureaucrat can observe the realization of $\omega$ and adjust their effort to account for the protest that they cannot deter with permit denials, as the regime would prefer. An incompetent bureaucrat cannot do this. In all cases, the bureaucrat selects a number or amount of protests to approve $a^*$, and the outcome of that effort is realized as $x^* = a^* + \omega$ protests.[7]

In this model, the autocratic regime primarily works to achieve its ideal protest result by firing and hiring bureaucrats. Punishing a bureaucrat can take many forms, including demotion, transfer (Hassan, Mattingly, and Nugent 2022; Brierley 2020), replacement (Shotts and Wiseman 2009), purging (Sudduth 2021; Nalepa 2022; Nalepa and Piotrowska, n.d.), incarceration (Shen-Bayh 2018, 2022), or even physical violence (Hilbink 2007). In Russia, the central regime punishes governors, whom we consider to be high-level bureaucrats with greater responsibility for oversight, by firing them, accusing them of crimes, and removing them from politics altogether. To align with research on authoritarian regimes, we use the term *punish* when the autocrat removes a bureaucrat, but note that it accounts for

6. We assume that loyalty and competence are independently assigned characteristics, such that a bureaucrat can be both loyal and competent or disloyal and incompetent. Some models assume that loyalty and competence are inversely related, so that a dictator would prefer a loyal advisor to a competent one (Egorov and Sonin 2011). This is certainly possible in our model without the limiting assumption that they be perfectly correlated. However, the distribution of types in the data described in Section 4.2 is such that 70% of the bureaucrats in our sample are loyal and competent. Loyalty and competence are negatively correlated in our data on Russian governors.

7. Because of the simplifying assumption that the bureaucrat can only make a dichotomous choice to repress dissent ($a = 0$) or allow it ($a = \epsilon$), and $\omega$ takes one of two forms, the only possible protest outcomes in the game are $x \in \{0, \epsilon, 2\epsilon\}$.

a range of negative outcomes for the agent. When the regime punishes a bureaucrat, it pays a cost $c_a > 0$ to remove and replace the agent with a new appointee or electoral candidate for the position. The bureaucrat incurs a penalty $c_b > 0$ if they are punished and a status quo payoff of 0 if they are not. Both $c_a$ and $c_b$ are exogenously given.

To summarize the sequence of moves:

0. Nature exogenously determines the type of bureaucrat in the model: $B$ is competent ($B_C$) with probability $\phi$ and loyal ($B_L$) with probability $\gamma$. $A$ does not know the loyalty or competence of the bureaucrat, only the probability with which they are either.

1. $A$ delegates authority to $B$ to repress or allow protests, with a contract $\rho \in \{0, \epsilon\}$ specifying the maximum amount of protest it will allow before punishing $B$.

2. A random shock of unmitigated protest $\omega \in 0, \epsilon$ is realized, which $B_C$ observes, but neither $A$ nor $B_I$ can observe the value of the realized shock. $\omega = \epsilon$ with probability $\theta$.

3. $B$ decides how much protest to approve in equilibrium $a^*$. This effort is transmitted with noise to the regime ($x^*$). The realization of $a^*$ is, therefore, $x^* = a^* + \omega$.

4. $A$ either retains or punishes $B$ ($\mathbb{1}(a_A = P)$), where purging requires the regime to pay the cost of effort $c_a$ and penalizes the bureaucrat $c_b$.

The utility function of each player is a simple calculation of their value for the protest outcome $x$ and the costs of punishment if relevant:

$$U_A = -(a + \omega - 0)^2 + \mathbb{1}(\Delta = P)c_a$$

$$U_B = -(a + \omega - x_B)^2 + \mathbb{1}(\Delta = P)c_b$$

## 2.2. Equilibrium Analysis

The solution concept is Perfect Bayesian Nash Equilibrium, which requires that the equilibrium strategies be sequentially rational in expectation, given that beliefs are consistent with updating under Bayes's Rule. The complete equilibrium and comparative statics are stated and proven in the Supplementary Appendix, including the standards of sequentially rational strategies under consistent beliefs. In the interest of space and parsimony, we focus here on the bureaucrat's strategy and the regime's choice of punishment rule.

The regime defines a punishment threshold $\rho$ where it punishes any bureaucrat whose region experiences an amount of protest above it ($x > \rho$) and retains those whose regions experience an equal or lower amount of protest than that, thus mapping all possible protest outcomes $x$ to a decision to retain or punish the bureaucrat $\rho : x^* \rightarrow \Delta\{\text{punish, retain}\}$. Because the regime's utility for protest is strictly decreasing in $x$, the autocratic regime will set the lowest possible punishment rule to maintain a pool of loyal or incompetent bureaucrats while keeping competent disloyal bureaucrats in check. Specifically, the regime will select either a lenient rule that allows the possibility of ungovernable protest from random shock without punishing the bureaucrat, denoted as $\overline{\rho} = \epsilon$, or a restrictive rule $\underline{\rho} = 0$, where it commits to punish a bureaucrat for any $x > \{\underline{\rho}, \overline{\rho}\}$.

Before we can derive what the regime will do, we must determine what choices a strategic bureaucrat will make under each type of punishment rule. We hold the punishment rule fixed and solve for the best responses of each type of bureaucrat. We begin with loyal bureaucrats under restrictive and lenient rules and then turn to disloyal bureaucrats.

Positive protests correlate with decreasing utility for both the regime and the loyal bureaucrat, so $B_L$ maximizes their utility by repressing all protests that they can, $a^* = 0$. If $\omega = 0$, both $A$ and $B_L$ receive optimal rewards from this action. When $\omega = \epsilon$, incompetent loyal bureaucrats, $B_{IL}$, cannot observe it, so they maximize repression ($a^* = 0$) to minimize as much protest as possible. Competent loyal bureaucrats can observe the shock, but still

prefer to minimize the protest regardless of the outcome, so they set $a^* = 0$. Regardless of competence and the stated punishment rule, a loyal bureaucrat represses as much as possible, which is exactly what the regime wants to happen. However, because the resulting protest combines the actions of the bureaucrat with the value of the random shock, $x^* = a^* + \omega$, the regime will observe $x^* = 0$ or $x^* = \epsilon$, even if the bureaucrat always sets $a^* = 0$.

**Result 1.** *When a bureaucrat is loyal, their best response strategy is to repress protests.*

An incompetent disloyal bureaucrat will similarly select $a^* = 0$ to avoid punishment under most conditions. A positive probability ($\theta$) that the shock will result in a protest, the potential cost of the ungovernable protest that would result ($\epsilon$), and the punishment that the bureaucrat expects ($c_b$) combine so that they are better off repressing than allowing the protest they would prefer to go forward. Their incompetence prevents them from observing the shock, so they cannot strategically work around it. However, $B_{ID}$ will risk punishment if they believe that ungovernable protest is very unlikely to occur and if the punishment for protest is low enough, whether under the restrictive or lenient punishment rule.

**Result 2.** *When a bureaucrat is incompetent and disloyal, their best response to the restrictive punishment rule is to repress protest ($a^* = 0$) when $c_b > \epsilon^2 - \epsilon^2\theta$. Denote this threshold by $c_b'$. When $c_b \leq c_b'$, $B_{ID}$ allows $a^* = \epsilon - \epsilon\theta$ protest to occur.*

*$B_{ID}$'s best response to the lenient rule is to repress protest ($a^* = 0$) when $c_b > \frac{\epsilon^2 - 2\epsilon^2\theta + \epsilon^2\theta^2}{\theta}$. Denote this threshold by $c_b''$. When $c_b \leq c_b''$, $B_{ID}$ allows $a^* = \epsilon - \epsilon\theta$ protest to occur.*

We map Result 2 into the equilibrium space in Figure 1, which illustrates the optimal strategies of disloyal bureaucrats as a function of the cost they incur for being punished ($x$-axis) and the result of the shock ($y$-axis). Red boxes indicate the best responses to the restrictive rule, blue boxes the best responses to the lenient rule, open boxes the best competent disloyal responses to observed $\omega$, and shaded boxes the best incompetent disloyal responses to unobserved $\omega$. Result 1 applies under all conditions, so loyal bureaucrats are not represented in this figure.

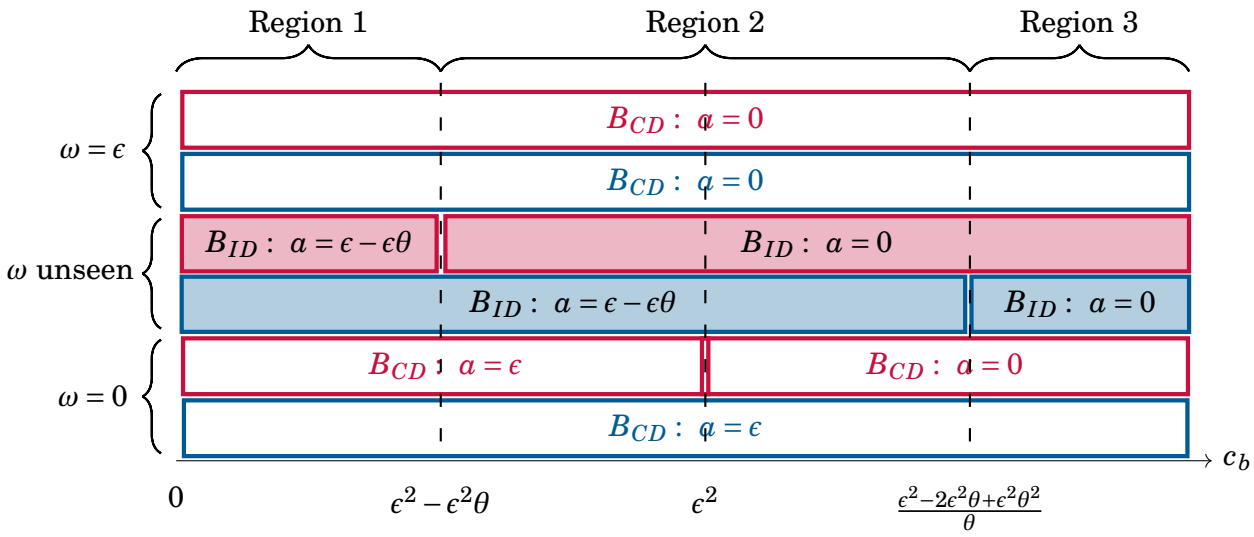


Figure 1: Disloyal bureaucrats' optimal strategies in equilibrium. Red boxes indicate the best responses to the restrictive rule, blue boxes the best responses to the lenient rule, open boxes the best competent disloyal responses to observed $\omega$, and shaded boxes the best incompetent disloyal responses to unobserved $\omega$.

**Figure 1 about here.**

When the bureaucrat is competent and disloyal ($B_{CD}$), they can observe and therefore condition their best response strategy on (i) the punishment threshold the government chooses and (ii) the outcome of the random shock of ungovernable protest.

When the punishment threshold is lenient ($\overline{\rho}$) and the competent bureaucrat knows that there will be ungovernable protest in their jurisdiction ($\omega = \epsilon$), they maximize their utility by setting $a^*_{CD} = 0$. The bureaucrat will already experience the maximum amount of protest that the autocratic regime will allow without punishing them ($x = \epsilon$), and this is the ideal point for the disloyal bureaucrat anyway. Deviating to allow even a little more protest $a^* > 0$ would mean that the regime would observe $x > \epsilon$ and punish the bureaucrat according to its lenient threshold strategy, so they will not deviate.

When the rule is lenient and the competent disloyal bureaucrat knows that there will be no ungovernable protest in their jurisdiction, $\omega = 0$, they maximize utility by leveraging

their informational advantage and setting $a^*_{CD} = \epsilon$. To allow fewer protests than this amount means that there will be fewer protests than the disloyal bureaucrat would prefer, and to approve more protests will incur the regime's punishment. This strategy produces protests that would not have occurred under a different bureaucrat type, and *it is the outcome that the autocratic regime does not want.*

If the regime imposes the restrictive rule of $\underline{\rho}$, the competent disloyal bureaucrat will be punished when the shock realizes as $\omega = \epsilon$. To the bureaucrat's advantage, the ungovernable protest is the amount of protest they wanted to allow, but they will be punished anyway under the restrictive rule. They will not deviate from this strategy to allow more protest than occurs under the shock because to do so directly decreases their utility under the quadratic loss function. If instead the bureaucrat observes that $\omega = 0$, they can allow some protest ($a^* = \epsilon$) when the penalty they would incur under the punishment is sufficiently low that it is worth the cost to allow some protest ($c_b \leq \epsilon^2$). The best responses of competent disloyal bureaucrats are outlined in Result 3 and illustrated in Figure 1.[8]

**Result 3.** *Denote the threshold $c_b = \epsilon^2$ by $c'''_b$. When a bureaucrat is competent and disloyal, their best response strategy is to set $a^*$ as follows:*

$$a^*_{CD} = \begin{cases} 0 & \text{if } \omega = \epsilon \\ \epsilon & \text{if } \overline{\rho} \text{ and } \omega = 0 \\ \epsilon - \epsilon\theta & \text{if } \underline{\rho},\ \omega = 0, \text{ and } c_b \leq c'''_b \text{ and} \\ 0 & \text{if } \underline{\rho},\ \omega = 0, \text{ and } c_b > c'''_b. \end{cases}$$

In sum, an information-advantaged disloyal bureaucrat allows no additional protest when they learn there will be ungovernable protest anyway, which is a best response to the positive shock regardless of the punishment threshold. In contrast, when they learn the

8. Figure 1 is drawn assuming that $c'''_b < c''_b$, but the opposite relationship is also possible.

shock has not resulted in protest, a competent bureaucrat under the lenient rule sets $a^* = \epsilon$ under hidden information from the regime, where one under the restrictive rule sets $a^* = \epsilon$ under some conditions and $a^* = 0$ under the rest. *This is the context in which the regime can curb the behavior of a bureaucrat by choosing a harsher rule.*

What incentive rule will the autocratic regime choose, anticipating the bureaucrat's best response strategy? If the regime selects $\underline{\rho}$, it punishes any bureaucrat whose region experiences a protest, whether randomly or intentionally. Implementing this rule forces the one bureaucrat who would purposely approve protests, $B_{CD}$, to change their strategy from $a^*_{CD}|(\omega = 0) = \epsilon$ to $a^*_{CD}|(\omega = 0) = 0$, minimizing the risk that they would be punished only to those conditions when $\omega = \epsilon$. When the punishment a disloyal bureaucrat would incur outweighs any utility they would receive by allowing $\epsilon$ protests when $\omega = 0$ (which is true when $c_b > \epsilon^2$), the restrictive rule forces bureaucrats who would like to disobey the regime to instead align their behavior with that of loyal bureaucrats. However, the restrictive rule means that the autocratic regime will punish even loyal bureaucrats when they are unlucky in the shock outcome, and it pays the cost $c_a$ for every protest that occurs through a random shock. In contrast, if the regime selects $\overline{\rho}$, it punishes any bureaucrat whose region experiences any protest $x > \epsilon$, retaining them in their position at the point of indifference. This allows a disloyal bureaucrat to hide among loyal bureaucrats and set $a = \epsilon$ when their region experiences $\omega = 0$ while others experience $\omega = \epsilon$.

The autocratic regime's expected utility for either punishment rule anticipates the probability that an ungovernable protest shock will occur and the distribution of bureaucratic types, neither of which it knows when setting the incentive contract/punishment rule. The rule that maximizes the regime's return (minimizing protest while also minimizing the expenses of punishing and replacing a bureaucrat) depends on the anticipated behavior of disloyal bureaucrats, as illustrated in Figure 1. We discuss the regime's optimal choice of the punishment rule by the "regions" of $c_b$ that define the best responses of bureaucrats

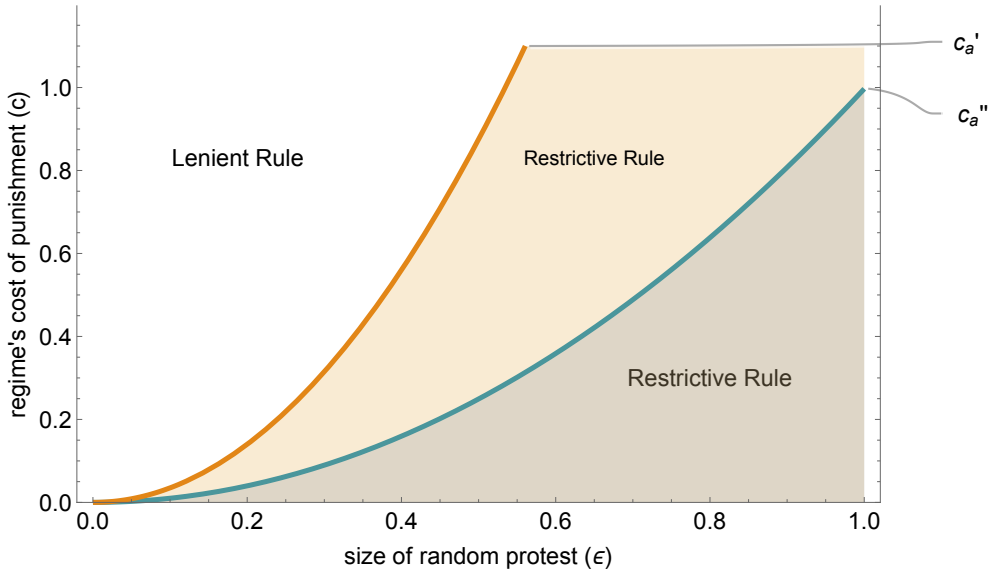


Figure 2: Autocratic regime's optimal punishment rule in equilibrium, as a function of the size of the randomly occurring ungovernable protest and the regime's cost of punishing the bureaucrat.

to those rules, as labeled in Figure 1. The thresholds that define the best responses of the autocratic regime by region are presented in Figure 2.

In Region 1 of Figure 1, the cost the bureaucrat pays if punished is so low ($c_b \leq c_b'$) that competent bureaucrats leverage the moral hazard to allow $\epsilon$ protest when they observe $\omega = 0$ and incompetent bureaucrats risk the low punishment to possibly get away with allowing $a^* = \epsilon - \epsilon\theta$ protest. Under these conditions, the autocratic regime prefers a more restrictive rule $\underline{\rho}$ , as long as the cost the regime pays to punish a bureaucrat is not too high $c_a \leq c_a'$. This threshold is defined in Result 4 and is represented by the orange line in Figure 2. To the right of (below) this line, the autocratic regime selects the more restrictive punishment strategy, punishing any bureaucrat who experiences protest in their jurisdiction.

**Figure 2 about here.**

**Result 4.** *When $c_b \leq c_b'$, A's best response is to set the restrictive rule $\overline{\rho}$ when*

$$c_a < \frac{2\epsilon^2\theta\phi - 3\epsilon^2\theta^2\phi + \epsilon^2\theta^3\phi}{1 - \theta - \phi + 2\theta\phi} \equiv c_a'$$

In Figure 1, Region 2, the bureaucrat's burden of punishment is high enough that the incompetent disloyal type will toe the line and repress under a restrictive rule, but will allow protest under a lenient one. In these conditions, the regime has no incentive to set a lenient rule; setting the restrictive one curbs bureaucratic shirking.

**Result 5.** *When $c_b > c_b'$ and $c_b < c_b''$, A's best response is to set the restrictive rule $\overline{\rho}$ for all possible parameter values.*

In Figure 1, Region 3, the bureaucrat's burden of punishment is so large that all bureaucrat types repress. This implies the autocratic regime could set the lenient rule to save itself the cost of replacing bureaucrats who are unlucky enough to have the random ungovernable protest in their jurisdiction. However, the regime will still prefer the restrictive rule if those costs are low enough $c_a \leq c_a''$ to ensure that all bureaucratic types maintain repression as their best response strategy. This threshold is defined in Result 6 and is represented by the teal line in Figure 2. To the right of (below) this line, the autocratic regime selects the more restrictive punishment strategy, punishing any bureaucrat who experiences protest in their jurisdiction. Above it, the regime chooses the more lenient rule.

**Result 6.** *When $c_b > c_b'$ and $c_b > c_b''$, A's best response is to set the restrictive rule $\overline{\rho}$ when $c_a < \frac{\epsilon^2\phi - \epsilon^2\theta}{\theta}$. Denote this threshold by $c_a''$.*

## 2.3. Comparative Statics

We derive comparative statics to identify the empirical implications as to when a bureaucrat will comply with or defy an autocratic regime's orders to repress within their jurisdiction. In this section, we discuss how changes in parameters of interest increase or decrease the likelihood that an average bureaucrat will repress or allow protests in their control.

**Figure 3 about here.**

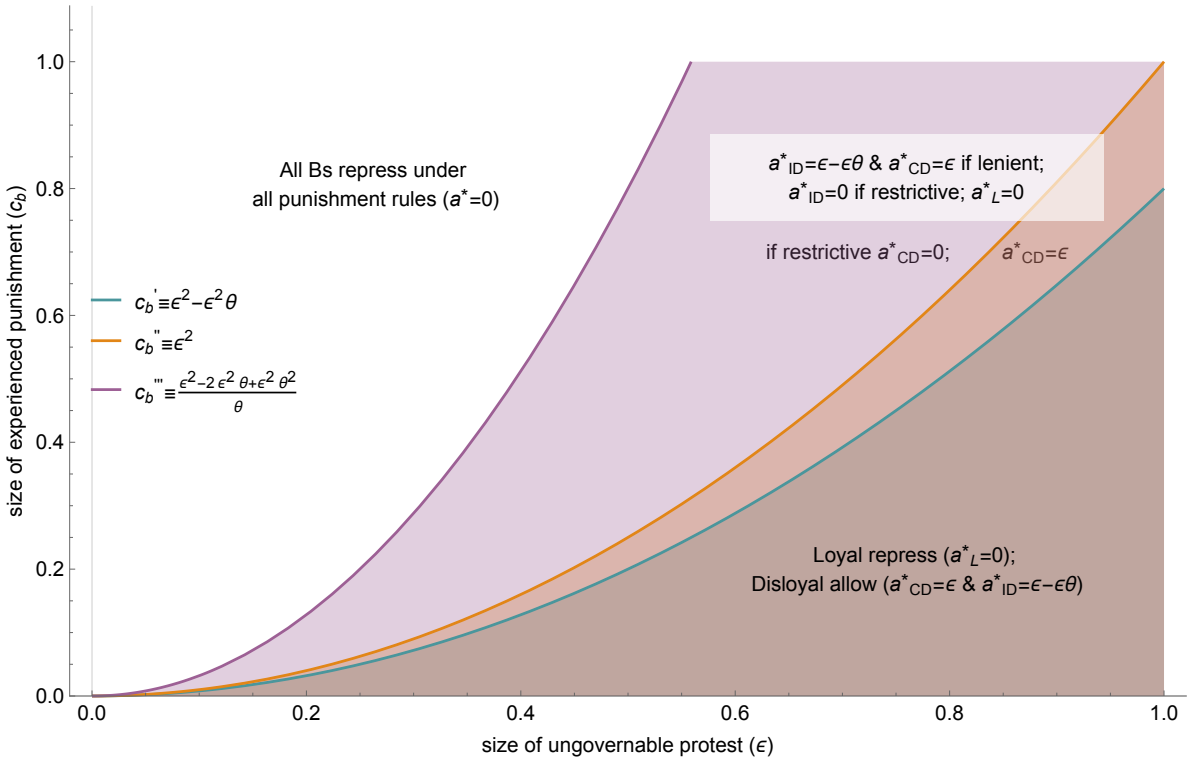


Figure 3: Bureaucrat choice to repress or allow protest when ungovernable protest is unlikely to occur ($\theta = 0.2$) and a competent bureaucrat observes none ($\omega = 0$).

In equilibrium, a loyal bureaucrat maximizes their utility by repressing all protests, regardless of their private information. A disloyal bureaucrat experiences goal conflict and would prefer to allow some protest if it is not too costly or risky to them. Following Results 2 and 3, a disloyal bureaucrat will be more willing to risk approving permits to protest than a loyal one. Consider Figure 3, which depicts the three indifference thresholds ($c_b'$, $c_b''$, $c_b'''$) defined in Results 1–3 at which disloyal bureaucrats of varied competence will allow or repress protests that they can govern. The $y$-axis specifies the value of $c_b$ that a given bureaucrat incurs if they are punished, such that higher values indicate greater penalties for protest that happens in their jurisdiction of control. Values of $c_b$ that are greater than each threshold motivate disloyal bureaucrats to repress when they would prefer to allow protests, and values that are less than (or to the right) of the thresholds indicate values for which bureaucrats will allow those protests at some risk of punishment. Figure 3 shows that there are real values of the model parameters for which disloyal bureaucrats will allow protests in

their region. In comparison, loyal bureaucrats repress all protests for all parameter values. This supports the following empirical implication of the theory:

**Implication 1.** *A loyal bureaucrat is more likely to repress than a disloyal bureaucrat.*

Among the disloyal set, a competent bureaucrat will defy repressive orders more frequently because they can do so with sufficient knowledge to avoid punishment. In contrast, a disloyal bureaucrat who does not have an informational advantage in their locality will not defy the regime so readily, doing so under more limited conditions and in lower amounts.[9]

**Implication 2.** *A disloyal incompetent bureaucrat is more likely to repress than a disloyal competent bureaucrat.*

Loyal bureaucrats do not change their behaviors as amounts of protest change, as they already repress all protests and cannot do it more. Disloyal bureaucrats who experience increasing unavoidable protest in their jurisdiction, however, allow more protests in this context. These bureaucrats prefer to allow protests for ideological, defiant, or any other reasons, and as $\epsilon$ increases in value relative to the regime's preference of $x = 0$, it becomes increasingly beneficial for the disloyal bureaucrat to allow them. As a result, the penalty for actualized protest must be much higher to force them to repress. This is illustrated in Figure 3. Moving to the right on the $x$-axis, the range of values of $c_b$ widens for which disloyal bureaucrats are willing to disobey the regime. Formally, the first derivatives of both $c_b'$ and $c_b'''$ with respect to $\epsilon$ are strictly increasing for all possible parameter values.[10]

**Implication 3.** *A bureaucrat is less likely to repress as the average amount of unavoidable protest ($\epsilon$) increases.*

The autocratic regime prefers a more restrictive punishment rule when it is likely that a bureaucrat will be competent and disloyal. It believes that this is the case when a bu-

9. This implication is also shown with a computational simulation of equilibrium behavior, as provided in the Supplementary Appendix.

10. Proof in Supplementary Appendix.

reaucrat is more likely to be competent ($\phi$ increases), disloyal ($\gamma$ decreases), and experience more unavoidable protest in their jurisdiction ($\epsilon$ increases).[11] Inversely, the regime will set a more lenient rule when it believes that bureaucrats are more likely to be loyal ($\gamma$) and less likely to be competent ($1-\phi$). Under these conditions, it expects that observing protest in a region is most likely to be a random shock of ungovernable protest, where it is not the fault of the bureaucrat who is acting according to the regime's orders. Punishing too frequently would remove loyal bureaucrats the regime prefers to retain for future periods.

Under these same conditions, disloyal bureaucrats of either informational status will be more likely to allow protests, defying repressive orders while expecting not to be punished. Because the autocratic regime sets its threshold strategy at the outset, the regime must rely on its prior beliefs about a given bureaucrat from indicators observable to it, not knowing the bureaucrat's type and therefore what they will do. Expecting the regime to assign protest to the noisy category and therefore let it pass without punishment, a disloyal bureaucrat can allow protest more frequently when they can hide among the loyal agents.

**Implication 4.** *As the likelihood that bureaucrats are loyal increases, and as the likelihood that bureaucrats are competent decreases, disloyal bureaucrats are both more likely to defy repressive orders ($a^* = \epsilon$) and less likely to be punished for their defiance ($\underline{\rho}$).*

Extending this logic, the expectation that protest will occur throughout the country can protect a disloyal bureaucrat. The autocrat, anticipating that unavoidable protest is likely to occur throughout many regions, chooses the more lenient threshold so as not to punish loyal bureaucrats who cannot help the protests in their region. The regime considers two inputs about the conflict environment: the probability ($\theta$) that the protest will materialize as $\omega = \epsilon$ and the actual value of $\epsilon$. The shock is realized differently in each particular region, but whether it is more likely to be $\epsilon$ or 0 is a distributional question that applies to all regions. As $\theta$ increases, the autocrat's expectation that protest will be $x = \epsilon$,

11. The autocratic regime is also less likely to choose a restrictive rule as the cost it incurs for punishing bureaucrats ($k$) increases. We show this in the Supplementary Appendix, but we do not focus on it empirically.

regardless of the bureaucrat type, increases. To avoid punishing too many of its preferred types of bureaucrat, the regime will set the more lenient punishment rule. Knowing this, both incompetent and competent disloyal bureaucrats will be more likely to defy repressive orders and hide their defiance behind supposedly unavoidable protest.

**Implication 5.** *A bureaucrat is less likely to repress as the likelihood that an unavoidable protest will occur in the average region ($\theta$) increases.*

## 3. Empirical Analysis

The formal model yields many implications for empirical patterns that we might observe in the world, supporting the wider usefulness of the theory for understanding how autocratic regimes repress through bureaucratic agents.[12] To focus our empirical analysis, we translate results related to (i) an administrative bureaucrat's loyalty to the autocratic regime, (ii) a bureaucrat's competence, and (iii) the amount of unauthorized protest experienced across the country, exploring how each of these independent variables predict the likelihood that a bureaucrat will comply with regime orders to repress.

**Hypothesis 1** (Individual loyalty)**.** *A bureaucrat who has preferences that align with the autocratic regime is more likely to repress than a bureaucrat whose preferences diverge.*

**Hypothesis 2** (Individual competence)**.** *A competent bureaucrat (who has private knowledge about likely dissent) is less likely to repress than an incompetent one on average.*

**Hypothesis 3** (Individual loyalty *and* competence)**.** *Among bureaucrats with divergent preferences from the regime, a bureaucrat with an informational advantage in their locality is less likely to repress than a bureaucrat without said advantage. Among aligned bureaucrats, an informational advantage will have no clear effect on repression patterns.*

**Hypothesis 4** (Protest in the country - $\epsilon$)**.** *As ungovernable protests in the country increase,*

12. All implications of the formal model are listed in the Supplementary Appendix with the model proofs, including implications we do not analyze with evidence in this manuscript.

*disloyal bureaucrats are less likely to repress in their jurisdiction in the following period.*

**Hypothesis 5** (Protest in the country - $\theta$)**.** *A disloyal bureaucrat is less likely to repress as the likelihood that an ungovernable protest will occur in the average region increases.*

## 3.1. The Kremlin, Russian Governors, and Protests

The decision-making structure of the formal model guides us to the scope conditions that define its generalizability. First, the theory focuses on regimes that allow opposition, have the capacity to repress potential challengers, and order security *and* administrative bureaucrats to do so. Executive and administrative bureaucrats have discretion to repress as the delegate of the autocratic regime. In contrast to most existing research, we do not model orders to security agents (e.g., Mitchell 2009; Dragu and Lupu 2018; Mummolo 2018; Liu and Sullivan 2021), nor do we examine the behaviors of agents who would repress constituents against the preferences of the regime (e.g., Conrad and Moore 2010). Second, the theoretical regime incentivizes bureaucrats to implement repressive policies by threatening their removal from their position. It must be possible and not uncommon that the central regime can punish a given functionary. Third, we assume that it is feasible that some bureaucrats will have divergent preferences from the regime. Preferences may diverge because the bureaucrats' ideology is different from that of the autocrat, they espouse local populations' preferences on an issue, or they share common ethnic identities with the local population. Though these conditions can be met in any regime type, and democracies certainly repress threatening populations, we focus on the most common and visible contexts that meet these conditions: authoritarian regimes. In particular, the case of Russia meets our theoretical assumptions and illustrates the logic of the model.

Alongside security agencies, the Kremlin delegates repression to executive and administrative bureaucrats who repress using strategies that do not involve the use of force. Our focus is on Russian governors. During the period we consider (2017-18), Russian governors

were directly elected by local populations in all but eleven federal regions.[13] The electoral process and the varied political leanings of regional populations have traditionally allowed a small number of politicians who are not aligned with the Kremlin or who are not members of the United Russia party to obtain gubernatorial office. We treat accountability to the local population as a driver of divergent preferences between governors and the Kremlin.[14]

Governors head the executive agencies in their jurisdictions and are at the top of the delegation chain of bureaucratic repression. In the course of their duties, Russian governors can repress by rejecting protest permits directly[15] or indirectly, by overseeing the work of local mayors and program officers tasked with reviewing protest notifications. In coordination with local employers and higher education administrations, governors can oversee politically motivated dismissals or student expulsions, and may even withhold social services because of groups' and individuals' political views.[16] Because our theory requires the central government to be able to directly dismiss and punish those responsible for protest outcomes, our focus on governors is more appropriate than mayors or lower-level administrators. The Kremlin does not directly contract with mayors or individual administrators tasked with reviewing protest permits and does not directly dismiss mayors.[17] To incentivize administrative repression, the Kremlin has linked local protests to governors' career progression. The extent of protest mobilization in a region is one of the key criteria used

13. In those eleven regions, most of which are located in the republics of the North Caucasus, governors are elected by regional parliaments, who choose from a list of three candidates drafted by the presidential administration. Gubernatorial elections, abolished by Putin in December 2004, were reintroduced in 2012.

14. While we are not the first to describe elected officials as bureaucrats (Bozcaga 2020), we acknowledge that elected governors are also principals in their position and not just agents. We also note that in authoritarian contexts, elected officials remain primarily accountable to the executive. In Russia, elected governors can be dismissed and replaced by the Kremlin regardless of whether they came to office through elections or not.

15. The governors of Moscow City, the Russian capital, and St. Petersburg are directly involved in decision to grant protest permits to anyone who applies

16. Russian governors are not in charge of protest policing. Frontline policing of protest actions is the responsibility of officers from two federal services, the *Politsiya*, which is under the control of the Ministry of Internal Affairs, and *Rosgvardiya*, created as an independent department, reporting directly to the Russian President.

17. Mayors can be dismissed by local assemblies for poor performance, by governors for limited technical reasons, and by courts for law-breaking. Empirically, governors are most frequently responsible for mayors' dismissals, often by leaning on city councils, prompting judicial involvement, asking the mayor to resign, or supporting alternative candidates in elections.

by the Kremlin to determine governors' reappointment or promotion within the administration. Protest sentiment in a region, one of the factors believed to affect electoral turnout and votes cast for the authorities, also affects governors' tenure.

Under federal law, the Russian president has wide discretion to dismiss and replace governors on the grounds of inadequate performance of duties and loss of confidence.[18] Russian governors are removed more frequently through presidential dismissal than at the ballot box. The dismissal of several Russian governors has been linked to the levels of protest in their region.[19] For example, the governor of the Novosibirsk region was forced to resign in October 2017. His resignation was directly related to the mass protests that took place in Novosibirsk in winter 2016 and spring 2017.[20] Several of the Novosibirsk protests were not authorized by local authorities. Protests against utility increases attracted large crowds and took a decisively political character when joined by the opposition leader Aleksei Navalny.[21] The dismissal of Samara's governor, Nikolai Merkushkin, in September 2017 was also related to regional levels of protest.[22] Before Merkushkin's dismissal there was an increase in unauthorized protests expressing opposition to the planned reduction in pension benefits for veterans and pensioners and condemning corruption in local government. The rise of unauthorized protests and their growing politicization also led to the dismissal of governors in Omsk Oblast (October 2017) and Altai Krai (May 2018).[23] Unauthorized protests taking place in St. Petersburg in 2017 and 2018, some of the largest in Russia, were also linked to

18. The latter is defined as the detection of corruption, conflict of interest, or possession of foreign bank accounts or securities. However, what constitutes "inadequate performance of duties" is not defined in the law. The Russian president is not obliged to provide any reasoning for the decision to dismiss a governor, and in practice these decisions are generally not given a public explanation. Governors are frequently fired and replaced with acting regional heads toward the end of their term of office. In this way, their successor can run as the regime candidate in the next election. Acting governors can take advantage of local administrative resources and enjoy greater visibility in the region, making it easier to win the next election.

19. See, for example, https://www.rbc.ru/politics/04/10/2017/59d4b95d9a7947bdced88533 and http://www.apecom.ru/articles/?ELEMENT_ID=4126.

20. See, for example: https://www.rbc.ru/politics/06/10/2017/59d755339a794795542354db and https://www.osw.waw.pl/en/publikacje/osw-commentary/2017-12-15/kremlins-regional-policy-a-year-dismissing-governors.

21. See, for example: https://www.kommersant.ru/doc/3275752

22. https://www.rbc.ru/politics/12/04/2017/58ee0aa89a7947c46b40f18a.

23. See, for example: https://www.omsk.kp.ru/daily/26741/3770255/; https://regnum.ru/news/2330968; andhttp://www.apecom.ru/articles/?ELEMENT_ID=4126.

the dismissal of the city governor, Georgii Poltavchenko, in October 2018. [24]

## 3.2. MEASUREMENT

We find descriptive and demonstrative empirical support for the explanatory power of our theory and its implications when we examine the correlates of instances of bureaucratic repression and protest approvals throughout 2017-2018 in Russia.

We begin by considering instances of bureaucratic repression against Aleksei Navalny's organization and supporters between January 2017 and March 2018. This was a period of extensive protest mobilization in Russia. Protests on issues of local and national importance coincided with two rounds of gubernatorial dismissals and three national days of protest in 2017 (March 26, June 12, and October 7). National protests were organized by Navalny supporters to demand action against government corruption. The first of the two days of national protest, in March and June 2017, occurred before the regional elections of September 2017, and the third day occurred shortly after. Presidential elections held in Russia on 18 March 2018 led to Vladimir Putin's reappointment.

We treat national coordinated protest as an operationalization of anticipated ungovernable protest, modeled in the theory as $\theta$. All government authorities knew when the protests would take place and had an estimate of how large they would be, though their actual realization in a given region varied. Navalny supporters resolved to protest with or without official approval. The protests therefore fit our concept of ungovernable protests that would make it difficult for the central regime to know if the bureaucrats were doing what was expected of them or not. The planned determination increases confidence that unauthorized protests taking place in any given region over the three days of national protests capture

24. See, for example: https://www.spb.kp.ru/daily/26738.7/3765575/. Notably, the Kremlin had reportedly been preparing the governor's dismissal as early as August 2016, but despite increasing protest and growing dissatisfaction with the governor, had delayed the decision until October 2018 due to complications in appointing his successor. The governorship of St. Petersburg is especially delicate because of the powerful interests in the city, with elites close to the President competing to nominate the next governor. Any replacement would have to satisfy these parties. As the theoretical model suggests, as the autocrat's cost of purging increases, punishments for uncontrolled protest become less likely.

the number of protest permits denied this time and are a good proxy of bureaucratic efforts at repressing.[25] The decision of Navalny supporters to proceed with protest despite protest bans also increases confidence that places with no protests on the three days were indeed localities in which no protest notifications were submitted (e.g. Dollbaum, Lallouet, and Noble 2021; Tertytchnaya 2023). The fact that all protests took place at the same time, were organized by the same group, and raised the same demands helps alleviate threats of inference arising from differences in the timing, content, or identity of organizers driving the bureaucrats' decision to ban protests. The case selection also offers the opportunity to observe the behavior of bureaucrats, i.e. their effort to comply with the order to repress, in response to a random shock where $\omega = \epsilon$ as defined in the model. The shock here is the coordinated action by Navalny supporters to protest across regions on the same day.

The analysis unfolds in two parts. In the first, the units of analysis are the region-month. We examine instances of bureaucratic repression against Navalny's organization and supporters between January 2017 and March 2018. During this fifteen-month period of observation around the planned events, there is variation in ungovernable protests and, therefore, in the relative strictness or tolerance of the autocrat's punishment rules. In the first analysis, we treat months of national coordinated protest as an operationalization of anticipated ungovernable protest, modeled in the theory as $\theta$. Across January 2017 and March 2018, many government bodies repressed the Navalny team in ways that anticipated these protests; we define the precise indicators of bureaucratic repression below. In the second analysis, the units of analysis are the region-protest wave. Here, we focus exclusively on the three days of national protests (March 26, June 12, and October 7, 2017). This allows us to look for implications of the model that hold with the shock being held constant.

The dependent variable in the estimates presented in Table 1 counts acts of bureau-

25. We differentiate conceptually between the outcomes of bureaucratic repression, i.e. whether permit denials succeed at preventing protest, and bureaucratic efforts at repressing. We focus on capturing bureaucrats' efforts to repress, as we do in the theory. We assume that the autocrat expects administrative bureaucrats to repress by denying permits and capture this effort through proxies of unauthorized protest, even though the protest occurs despite being unauthorized.

cratic repression from January 2017 to March 2018 against Team Navalny. This is measured at the region-month level. The data comes from a collaboration between Meduza, an online news aggregator, and OVD-Info, an advocacy group and independent media project launched in 2011 as a means of monitoring arrests during mass protests in Russia. As instances of bureaucratic repression, we code the following: pressure against "Team Navalny" by the city administration, pressure from the administration of regional education establishments and departments, and pressure from city and regional administrations. Specific examples of bureaucratic repression include fines, threats to city employees, pressure on students in coordination with university administrations, and denials of protest permits on any given day. Regional governors, who oversee the work of local and regional administrations and departments, can be directly linked to such instances of repression.

For the second analysis (Table 2), bureaucratic repression is measured as the share of all protest permit applications that were denied on each of the three days of nation-wide protest in 2017 in any given region. We calculate this as the count of unauthorized Navalny protests divided by the count of all protests in any given region/time. We use this as a proxy for governors' efforts to repress protests. Navalny's team did not hesitate to submit permit applications in places where permits would be denied and was not deterred by protest permit denials. Thus, the share of denied permit applications that took place anyway represents the amount of repression that the team experienced in that region rather than the outcome of a selection process. Information on Navalny-led anti-corruption protests taking place during three national days of protest also comes from Meduza and OVD-Info.

We capture the loyalty of governors to the Kremlin with the help of a proxy variable that captures whether the regional governor is affiliated with a systemic opposition party (such as the Communist Party of the Russian Federation or the Liberal Democratic Party of Russia) or the governor was nominated and elected as independent candidate. A governor is counted as "disloyal" to the Kremlin if they are independent, a member of an opposition

party, or nominated in the current post by a party other than United Russia, Putin's party of power. This is a binary variable, coded one to indicate affiliation with an opposition party or a candidate running as independent and zero otherwise. Six percent of the sitting governors in January 2017 and March 2018 had no affiliation with UR. This affiliation is known to the Kremlin and so is an indicator of the governor's likely alignment with the regime's policy preferences, but it is an imperfect indicator of latent agreement or disagreement, as all party affiliations are. Therefore, it represents the probability that the governor is (dis)loyal, which is the concept of interest from the theory, not a true measure of loyalty.

As a proxy for governors' competence – conceptualized as an information advantage about likely protests relative to the regime's knowledge of the same – we use an item that captures whether governors spent time in a region prior to assuming office. We expect governors with connections to a region to have a local knowledge advantage, to be better able to manage local affairs, and to have a better understanding of protest sentiment in a region. Agents who have spent more time in a region may have more and better knowledge about that region and perform better than others (Khokhlov 2024). This is a binary indicator coded as one if a governor had spent time in a region prior to coming into office, and zero otherwise. Similarly to the measure of loyalty, this proxy for competence is an indicator that the regime would know and use to predict likely competence.[26]

We include indicators of the lagged count of unauthorized protests across Russia to measure the size of ungovernable protests, $\epsilon$. This information comes from the namarsh.ru website, a protest website that collects protest news from sources throughout Russia. Estimates presented control for time (year or protest-wave) fixed effects and for federal district fixed effects. We report the estimates of OLS regression models.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Disloyal | -0.089** | | | |
| | (0.044) | | | |
| Competent | -0.030 | | | |
| | (0.031) | | | |
| *Disloyal/Competent (DC)* | | | | |
| Loyal/Incompetent(LI) | | 0.206*** | 0.220*** | 0.112 |
| | | (0.068) | (0.075) | (0.069) |
| Loyal/Competent(LC) | | 0.187*** | 0.201*** | 0.102 |
| | | (0.066) | (0.072) | (0.067) |
| Disloyal/Incompetent(DI) | | 0.186** | 0.196** | 0.138* |
| | | (0.082) | (0.088) | (0.083) |
| Navalny months | 0.342*** | 0.342*** | 0.347*** | -0.074 |
| | (0.051) | (0.051) | (0.052) | (0.072) |
| Lagged unauth protest | | | 0.349*** | |
| | | | (0.106) | |
| LI X Navalny months | | | | 0.474*** |
| | | | | (0.123) |
| LC X Navalny months | | | | 0.423*** |
| | | | | (0.095) |
| DI X Navalny months | | | | 0.213 |
| | | | | (0.164) |
| Year FE | 0.036 | 0.036 | 0.051 | 0.036 |
| | (0.035) | (0.035) | (0.038) | (0.035) |
| Constant | 0.084** | -0.139* | -0.248*** | -0.055 |
| | (0.036) | (0.071) | (0.085) | (0.072) |
| Observations | 1,245 | 1,245 | 1,162 | 1,245 |
| R-squared | 0.094 | 0.096 | 0.100 | 0.099 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1: OLS regression estimates as to the effects of bureaucratic characteristics on instances of administrative repression. The dependent variable for all estimates is the count of administrative cases occurring at any region-month from January 2017 to March 2018.

## 3.3. RESULTS

In the estimates presented in Table 1, the unit of analysis is the region-month. Eighty-three regions were observed from January 2017 to March 2018. Aligning with Hypothesis 1, the

26. In the Supplementary Appendix, we present results that rely on two alternative proxies for governors' competence: training for the job and business background. The results remain largely consistent.

evidence in Model 1, Table 1, suggests that there were fewer instances of administrative repression in regions with "disloyal" governors, those who were not affiliated with United Russia. There were more instances of administrative repression in regions with loyal governors supported by United Russia. Although the indicator of "competence" is also negatively signed, as Hypothesis 2 suggests, it does not reach conventional levels of significance.

**Table 1 about here.**

In Model 2, we compare instances of administrative repression in regions with (dis)loyal and (in)competent governors. There are four sets of region-months: with governors who are loyal and competent (corresponding to roughly 70% of the sample), loyal and incompetent (corresponding to 24%), as well as disloyal and competent (2%) and disloyal and incompetent (4%). Of interest is the comparison between competent and incompetent bureaucrats who belong to the loyal and disloyal set. In this model, we set the disloyal and competent bureaucrats as the baseline category. The comparison between the different sets of governors supports Hypothesis 3. Compared to places with disloyal and competent governors, repression is heightened in places with disloyal and incompetent bureaucrats. The differences between loyal competent and loyal incompetent governors do not reach conventional levels of statistical significance [-.02 (95% CI: -.08, -.05)], consistent with our expectations.

In Model 3, we examine Hypothesis 4. The lagged count of unauthorized protest in Russia, which we use as a proxy of the size of ungovernable protests, $\epsilon$, shapes patterns of bureaucratic repression in places with loyal and disloyal governors.[27] The evidence suggests that an increase in unauthorized protests throughout the country prompts loyal but not disloyal regional authorities to become more repressive toward the Navalny team.

Finally, Model 4 compares patterns of repression across region-months governed by the four sets of (dis)loyal/(in)competent governors introduced earlier. We interact the governors' loyalty and competence indicator with a binary item that is coded 1 for months of

27. This analysis omits the district fixed effects because the lagged protest item does not vary spatially.

nation-wide, anti-corruption protests organized by Team Navalny (March, June, and October 2017) and 0 otherwise. Here, we treat months of national coordinated protest as an operationalization of anticipated ungovernable protest, modeled in the theory as $\theta$. Although this item does not vary across regions in this setup – the "shock" is constant across the country – it varies over time. The interaction term allows us to test Hypothesis 5 which anticipates disloyal bureaucrats to be less repressive when the likelihood that ungovernable protest will occur in the average region is greater.

The comparison between places with disloyal competent bureaucrats in months of coordinated protests and other times is negatively signed as predicted but fails to reach conventional levels of statistical significance (-.07, 95% CI: -.22, .07). Given the small number of bureaucrats in this category, our ability to draw inferences is limited. The comparison between places with disloyal and incompetent bureaucrats in months of coordinated protests and other times also fails to reach conventional levels of significance. Again, the fact that repression does not increase during months of large unauthorized protests in places with disloyal governors is in line with the theory. Repression in places with disloyal governors contrasts sharply with repression in places with loyal governors, which see an escalation of repression during months of Navalny protests.

In summary, during periods of widespread unauthorized protest, disloyal governors, competent or not, do not match the repressive efforts of their loyal counterparts, defying the Kremlin's orders to repress harshly. The left-hand graph of Figure 1 is based on Model 2 in Table 1 and shows the marginal effects of bureaucratic type on the probability of administrative repression. The right-hand plot of Figure 1 is based on Model 3 in Table 1 to plot the marginal effects of Navalny protest months across the four types of bureaucrats.

Having tested expectations across a longer time span, we focus on the three waves of widespread unauthorized protest organized by Team Navalny to condemn government corruption. The unit of analysis reported in Table 2 is the region-wave (there are 76 regions

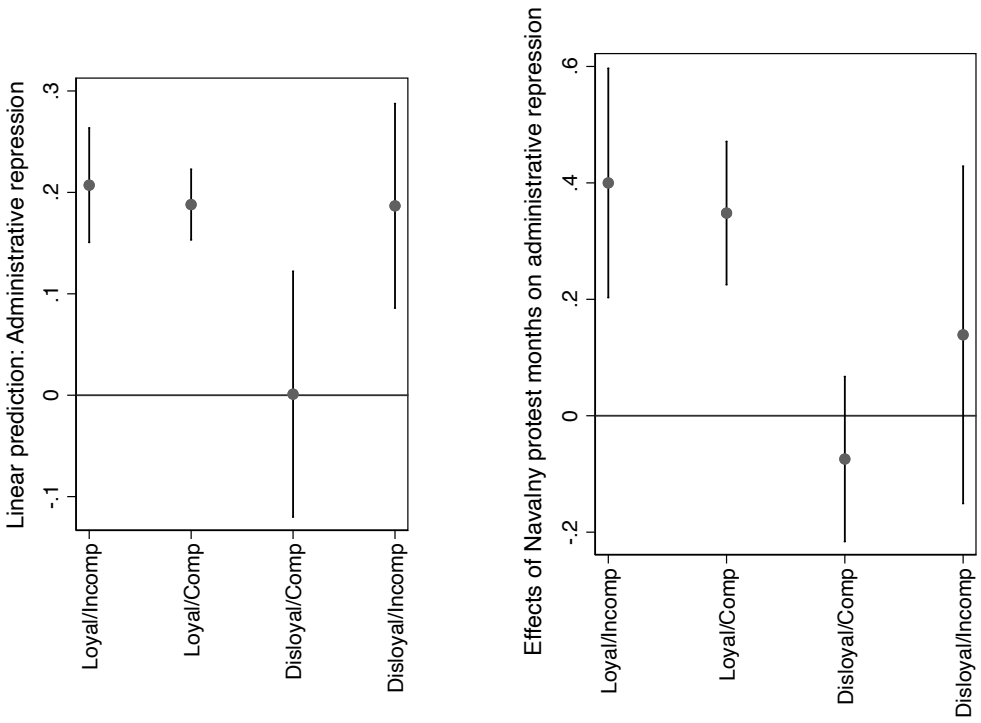


Figure 4: Bureaucrats' type and administrative repression (2017-2018)

with protest observed on March 26, June 12, or October 7). The dependent variable in Table 2 is the share of protests that are unauthorized taking place in each region-wave.

**Table 2 about here.**

The results in Table 2 are reassuring, being similar to those reported in Table 1. Model 1 lends support for Hypothesis 1. It suggests that bureaucratic repression, approximated by the share of protests that were unauthorized, is lower in regions with governors who are disloyal to the Kremlin. Model 1 also lends support for Hypothesis 2; it suggests that a competent bureaucrat (who has private knowledge about likely protests) is less likely to repress than a less incompetent one on average. Model 2 also provides some support for Hypothesis 3, that disloyal governors who lack a local knowledge advantage repress more than governors who are disloyal yet competent, though this difference fails to reach conventional levels of statistical significance. Finally, Model 3 provides some support for Hypothesis 4.

It suggests that as ungovernable protests in the country increase, disloyal governors do not intensify their repressive efforts in their jurisdiction in the following period.[28]

| | (1) | (2) | (3) |
|---|---|---|---|
| Disloyal | -0.222*** | | -0.102 |
| | (0.084) | | (0.117) |
| Competent | -0.138** | | -0.140** |
| | (0.069) | | (0.069) |
| *Disloyal / Competent (DC)* | | | |
| Loyal/Incompetent (LI) | | 0.288*** | |
| | | (0.107) | |
| Loyal/Competent (LC) | | 0.140 | |
| | | (0.091) | |
| Disloyal/ Incompetent (DI) | | 0.012 | |
| | | (0.149) | |
| Changes in protest | | | 1.201*** |
| | | | (0.283) |
| Disloyal X Ru protest | | | -0.824** |
| | | | (0.403) |
| Constant | 0.205*** | -0.069 | 0.028 |
| | (0.078) | (0.112) | (0.097) |
| Time FE | Yes | Yes | Yes |
| Federal District FE | Yes | Yes | Yes |
| Observations | 198 | 198 | 198 |
| R-squared | 0.224 | 0.225 | 0.232 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: OLS regression estimates as to the effects of bureaucratic characteristics on the share of unauthorized protest in any region/ month. The dependent variable for all estimates is the share of unauthorized protest taking place across regions on the three days of nation-wide Navalny protests.

# 4. Conclusion

Governments complement physical repression with administrative repression to control and suppress groups that oppose their policies. Political scientists understand why security

28. We cannot test Hypothesis 5 with this specific data since the likelihood that an ungovernable protest will occur in the average region does not vary in this setup.

agents comply with orders to repress (Cohen 2016; Tyson 2018) or repress as a result of delegation slack (Butler, Gluch, and Mitchell 2007; Conrad and Moore 2010), but we understand less about why administrative bureaucrats repress constituents on behalf of the state. How do administrative bureaucrats decide whether to comply with autocratic orders to repress collective protest?

We drew on scholarship on both political violence and comparative bureaucracies to argue that agents under the severe control of autocratic regimes will defy orders when there is sufficient noise in the political environment to conceal their disobedience. We presented a formal delegation model with a principal wanting to minimize anti-regime protests and an agent with the power to control protest outcomes in their region by supervising administrative decisions, deriving implications as to when bureaucrats will approve or repress political protests before they occur. This theory draws on tried-and-true models of delegation to bureaucratic agents of the state, newly applied to the context of repressive bureaucracy. The regime is uncertain as to whether a given bureaucrat is loyal (though they often are) or competent (having an informational advantage regarding their region), and so it must draw conclusions about these characteristics from observable authorizations and protests. While the majority of bureaucrats repress as ordered in an autocracy, the competent, disloyal functionaries are more likely to defy said orders when they know the regime expects the average bureaucrat to be loyal, incompetent, and experiencing ungovernable protest.

We provided illustrative tests of the empirical implications of the theory with data on bureaucratic repression in Russia during 2017-2018, centering our analysis on regional governors. Governors are Kremlin delegates and are tasked with maintaining political order within the region under threat of removal, but they also have varied goal conflict because they are elected. We collected original data on the political background of regional governors throughout the period of interest. First, we analyzed how individual characteristics of governors approximating their likely loyalty and competence and varied levels of ungovern-

able protest affect the use of several types of administrative repression against the primary political opponent at the time, the organization supporting Aleksei Navalny. Second, we estimated the statistical relationship between the same independent variables and the preponderance of Navalny protests that were repressed (unauthorized) in each federal region during three days of organized national protests in the same period.

We found consistent empirical support for most of the theoretical implications, suggesting that the intuitions and utility of the formal model are supported in practice. Unsurprisingly, governors of the same political party as President Putin repress the Navalny team more frequently than those who are not loyal to the Kremlin. Competent governors, those who have more informational experience with politics in the region they administer, are more likely to defy repressive orders than less competent ones. This finding is consistent with the idea that dictators fear agents who have greater competence. We extend this knowledge by demonstrating that competence and loyalty do not have to co-occur in a single dimension (Egorov and Sonin 2011). Furthermore, periods of heightened political challenges create opportunities for bureaucratic defiance of repressive orders because the central regime loosens its grip on its agents during such periods.

In a broader sense, we are early movers in connecting the study of bureaucracy to repressive processes. Political violence scholars overwhelmingly focus on security agents and their use of physical integrity violations to control oppositions, especially but not only in dictatorships. We turn instead to *civil rights violations* administered through permit offices and official departments, which complement the threat of violence in the overarching structure of political control. Security agents and administrative agents differ significantly in what motivates them to repress and comply with orders, as well as the violence or nonviolence of the control tactics available to them. Scholars have studied the presence of *nonviolent control tactics* such as voting limits and censorship, but few have examined the bureaucrats themselves and how they make decisions to implement these policies.

We focused our explanation and evidence on autocracies, speaking to contexts where national leaders or parties can directly admonish high-level agents for disobedience and use punishments to motivate compliance. In the bulk of comparative politics scholarship, scholars study questions of bureaucratic effectiveness in democracies and democratizing states. Much less is known about bureaucratic processes and the principals and agents within them in autocracies. Many studies in this context examine negative outcomes, such as corruption and clientelism, as limiting effective service delivery. Yet, this is a meaningful and not well-understood aspect of autocratic control: How does a principal motivate an agent to be effective when the policy goal is a repressive one? We contend it uses the threat of punishment and observable indicators of agents' loyalty and competence, combined with its expectations of uncontrolled protest, to incentivize agents to repress. The evidence presented here supports this by studying how bureaucrats respond to these implied strategic actions, but future work should focus on autocratic actions to force administrative repression.

The primary contribution to research on both repression and bureaucracy is the development of the concept of bureaucratic repression and its expression in a rigorous theory of delegation and output. This is a dominant strategy of control in countries of all types, as seen in the Jim Crow South, service delivery in India and Kenya, identity administration in South Africa, and control over land rights in Peru and Australia. However, political scientists rarely study, explain, or observe these practices as forms of repression. With this project, we hope to shift the discussion to include instances and strategies of bureaucratic repression to better anticipate and understand these behaviors.

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# A. Case Details

## A.1. Russian governors' dismissals: 2017-2018

We review qualitative evidence on the reasons the Russian regime dismisses governors. Our review focuses on the period between 2017-2018, as discussed in the manuscript.

In September 2017 regional elections were held across Russia. Following the elections, the Kremlin dismissed several governors. During this period there were also cases of 'voluntary resignation.' The Presidential Administration pressured several incumbents to resign, but on the understanding that by voluntarily resigning they will be offered another position. News reports and political commentary published in early October 2017 referred to several governors as potentially at risk of losing office. The perilous survival of the governors was directly related to the high levels of protest in the region.[29] The governors rumored to be at risk of losing office in October 2017 were those who led the Republic of Altai, Altai Krai, Samara Oblast, Novosibirsk Oblast, Omsk Oblast, Pskov Oblast, and St. Petersburg. The governors of Samara, Novosibirsk, Omsk, and Pskov were indeed removed in the fall of 2017. The governor of Altai Krai left office in the spring of 2018, while the governor of St. Petersburg survived until October 2018.

Dismissals of governors taking place during this period support the proposition that as the amount of uncontrolled protest grew in a region, the likelihood that the governors would be dismissed also increased. For example, the governor of the Novosibirsk region, Vladimir Gorodetsky, was forced to resign in October 2017. His resignation was directly related to the mass protests that took place throughout 2017.[30] Several of the Novosibirsk protests were not authorized by the local authorities. In addition, the protests that followed the announcement of a 15% increase in utility charges took a decisively political character when joined by the opposition leader Aleksei Navalny.[31] Protests against utility increases throughout winter 2016 and spring 2017 attracted large crowds. Protests advancing socio-economic and political demands in Novosibirsk continued in the summer of 2017. Commenting on the frequency, routinization, and scale of protest in the region, a former deputy governor suggested that 'locals in Novosibirsk went to meetings and rallies like they were going to work'.[32]According to reports, there was a risk that an established protest movement could also target the presidential election of March 2018, serving to dampen turnout and reduce votes for Putin.[33]

The dismissal of Samara's governor, Nikolai Merkushkin, in September 2017 was also connected to regional levels of protest.[34] Preceding Merkushkin's dismissal was the increase in unauthorized protests expressing opposition to the planned reduction in pension benefits

29. See, for example, https://www.rbc.ru/politics/04/10/2017/59d4b95d9a7947bdced88533 and http://www.apecom.ru/articles/?ELEMENT_ID=4126

30. See, for example: https://www.rbc.ru/politics/06/10/2017/59d755339a794795542354db and https://www.osw.waw.pl/en/publikacje/osw-commentary/2017-12-15/kremlins-regional-policy-a-year-dismissing-governors

31. See, for example: https://www.kommersant.ru/doc/3275752

32. https://www.rbc.ru/politics/06/10/2017/59d755339a794795542354db

33. https://www.kommersant.ru/doc/3275752

34. https://www.rbc.ru/politics/12/04/2017/58ee0aa89a7947c46b40f18a

for veterans and pensioners and condemning government corruption. These protests were led by the Communist Party and Navalny supporters, respectively. In both types of protest, demonstrators accused the governor of abuses and asked for his resignation. Reforms in social benefits were closely associated with the governor; several of the slogans at protest events criticized him directly for them.[35] The rise of unauthorized protests and their growing politicization in the Omsk oblast and Altai Krai were also cited as factors leading to the dismissal of their governors in October 2017 and May 2018 respectively [36].

Unauthorized protests taking place in St. Petersburg across 2017 and 2018 were some of the largest in Russia. The protests were linked to the dismissal of the city governor, Georgii Poltavchenko, in October 2018. Reporting in September 2017 reported that Poltavchenko would be replaced after the presidential election of March 2018.[37] Although Poltavchenko managed to stay in office until October 2018, the levels of protest in St. Petersburg were cited as a key reason for his dismissal.[38] In particular, the anti-corruption protests coordinated by Team Navalny in St. Petersburg in March and June 2017 were the largest outside of Moscow. The March protest went ahead on the Field of Mars without the permission of the authorities, then developed into a march down the Nevskyi Prospekt that ended with around forty arrests.[39] The June 2017 protest was again unauthorized. In the days leading up to the protest, the city authorities tried to warn people away. However, the protest attracted large crowds and resulted in the arrests of more than 500 people.[40]

Notably, the Kremlin had reportedly been preparing Poltavchenko's dismissal as early as August 2016, but despite increasing protest and growing dissatisfaction with the governor, had delayed the decision until October 2018 due to complications in appointing his successor. The governorship of St. Petersburg is especially delicate because of the powerful interests in the city, with elites close to the President competing to nominate the next governor. Any replacement would have to satisfy these parties. As the theoretical model suggests, as the autocrat's cost of purging increases, punishments for uncontrolled protest become less likely.

## A.2. The protest authorization process in Russia

Various bureaucratic agencies are tasked with reviewing protest notifications and authorizing protest in Russia. These include local committees (such as the Committee for Matters of Legality, Rule of Law, and Security in St. Petersburg), city administrations, and regional departments for public security matters. In Moscow city and in St. Petersburg, city mayors, who head the Executive are directly involved in the protest approval process.[41] Across Rus-

35. https://regnum.ru/news/2251667

36. See, for example: https://www.omsk.kp.ru/daily/26741/3770255/; https://regnum.ru/news/2330968; http://www.apecom.ru/articles/?ELEMENT_ID=4126

37. https://tvrain.tv/news/kreml_gubernatora_peterburga-448296/ and https://www.spb.kp.ru/daily/26738.7/3765575/

38. See, for example: https://www.spb.kp.ru/daily/26738.7/3765575/)

39. See, for example: https://meduza.io/feature/2017/03/26/molodezh-bez-vozhdey

40. See, for example: https://www.dp.ru/a/2017/06/12/Antikorrupcionnij_miting

41. The Government of Moscow is the highest executive body in the city, headed by the city's Mayor. The city of Moscow has a special status as a "federal" region, as does the city of St. Petersburg.

sia, the regional authorities must be typically notified when protest organizers expect more than five thousand participants, and when a planned protest action is expected to take place across multiple districts or cities.

Notifications of a planned protest action must be submitted to local administrations several days before the scheduled action. Russian authorities commonly use the notification process as a *de facto* authorization procedure.[42] Local administrative authorities can deny authorization for protest organizers' requested protest time or location and can ban protests deemed to be in violation of the constitution. Administrations tasked with authorizing protests in Russia have wide discretion to refuse permits and use the process to discriminate against groups for the content of their speech. Pro-government protests go ahead uninterrupted, while permits for protests that are critical of authorities and the government are only selectively issued. Federal and regional legislation on protests does not incorporate adequate or effective safeguards against the arbitrary use of laws by a bureaucrat.

42. The delegation of responsibility for authorizing protests to local administrators, rather than to local police, dates back to the last years of the USSR

# Empirical Appendix

## A Details of data and variables

Table A1 describes the variables we collected on governors' attributes and the regional incidence of protests and bureaucratic repression

Table A1: Main model variables

| **Variable and Source** | **Description** |
|---|---|
| Dependent variables | |
| Instances of bureaucratic repression against Team Navalny<br>*Source: Meduza & OVD-Info* | Counts the number of instances Team Navalny was issued fines, faced threats, or denied protest permits in a region-month. Also includes instances of pressure on students across educational establishments. (The dependent variable in Table 1.) |
| Share of unauthorized protests<br>*Source: Meduza & OVD-Info* | The count of unauthorized protests divided by the count of all protests in any given region/time. (The dependent variable in Table 2.) |
| Main independent variables | |
| Governor disloyalty<br>*Source: HSE governors datafile & Wikipedia profiles of governors* | Coded 1 if the region's governor is affiliated with a systemic opposition party such as the CPRF or LDPR, or if the governor was nominated and elected as an opposition candidate. Otherwise, coded as 0. |
| Governor competence/ Prior experience in a region<br>*Source: HSE governors datafile & Wikipedia profiles of governors* | Coded 1 if the the region's governor spent time in the region prior to coming into office and 0 otherwise. |

| | |
|---|---|
| Navalny protest months | Coded 1 for all regions for March, June, and October 2017, when Navalny staged national protests, 0 otherwise. |
| National unauthorized protests<br>*Source: namarsh.ru* | Count of unauthorized protests across Russia in all regions nationally in the current month. In the main analysis, we lag the variable by 1 month. |
| Independent variables used in robustness checks | |
| Governor competence/ School of Governors<br>*Source: Wikipedia profiles of governors* | This variable is recorded as 1 for regions with governors who are known to have participated in the "Personnel reserve programme" (Программа кадрового резерва), known informally as the "School of governors"; and 0 for those who have not. This is a 9-month training programme at the Higher School of Public Administration (Высшая школа государственного управления) within the Russian Presidential Academy of National Economy and Public Administration (Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации, or РАНХиГС). Coding draws on the governors' Wikipedia biographies, as well as media reporting. |
| Governor competence/ Business background<br>*Source: Wikipedia profiles of governors* | This variable is coded as 1 for regions with governors whose employment history includes experience within the private sector in any position, managerial or otherwise. It excludes those whose only experience within this sector is in blue-collar roles, e.g., manufacturing roles within factories. The variable is coded 0 for governors with no known private sector experience, such as those who have been employed in public administration, security, or military roles throughout their careers. |

## B Descriptive statistics

Table A2 shows descriptive statistics for the models in Table 1. Table A4 shows descriptive statistics for the models in Table 2. Tables A3 and A5 show the number of region-months recorded for each combination of the (Dis)Loyalty/(In)Competence variable used in the regressions.

Table A2: Descriptive statistics for models in Table 1

| **Variable** | **N** | **Mean** | **SD** | **Min** | **Max** | **Median** |
|---|---|---|---|---|---|---|
| Administrative actors | 1245 | 0.19 | 0.53 | 0.00 | 4.00 | 0.00 |
| Disloyal | 1245 | 0.06 | 0.25 | 0.00 | 1.00 | 0.00 |
| Competent | 1245 | 0.72 | 0.45 | 0.00 | 1.00 | 1.00 |
| Navalny protest | 1245 | 0.20 | 0.40 | 0.00 | 1.00 | 0.00 |
| Unauth protest (1 month lag) | 1162 | 0.27 | 0.13 | 0.08 | 0.61 | 0.22 |
| Year | 1245 | 2017.20 | 0.40 | 2017.00 | 2018.00 | 2017.00 |
| Federal district (FE) | 1245 | 3.61 | 2.03 | 1.00 | 7.00 | 3.00 |
| Competent (gov school) | 1245 | 0.04 | 0.20 | 0.00 | 1.00 | 0.00 |
| DL/IC (gov school) | 1245 | 0.22 | 0.72 | 0.00 | 3.00 | 0.00 |
| Competent (business school) | 1245 | 0.38 | 0.49 | 0.00 | 1.00 | 0.00 |
| DL/IC (business school) | 1245 | 0.55 | 0.76 | 0.00 | 3.00 | 0.00 |

Table A3: Counts of (Dis)Loyalty/(In)Competence for models in Table 1

| Loyalty/competence | N |
|---|---|
| Loyal, incompetent (LI) = 0 | 294 |
| Loyal, competent (LC) = 1 | 871 |
| Disloyal, competent (DC) = 2 | 30 |
| Disloyal, incompetent (DI) = 3 | 50 |

Table A4: Descriptive statistics for models in Table 2

| Variable | N | Mean | SD | Min | Max | Median |
|---|---|---|---|---|---|---|
| Share of unauthorized protests | 198 | 0.31 | 0.42 | 0.00 | 1.00 | 0.00 |
| Disloyal | 198 | 0.07 | 0.26 | 0.00 | 1.00 | 0.00 |
| Competent | 198 | 0.72 | 0.45 | 0.00 | 1.00 | 1.00 |
| Changes in protest | 198 | 0.14 | 0.19 | -0.06 | 0.40 | 0.15 |
| Competent (gov school) | 198 | 0.03 | 0.16 | 0.00 | 1.00 | 0.00 |
| DL/IC (gov school) | 198 | 0.24 | 0.78 | 0.00 | 3.00 | 0.00 |
| Competent (business school) | 198 | 0.38 | 0.49 | 0.00 | 1.00 | 0.00 |
| DL/IC (business school) | 198 | 0.58 | 0.79 | 0.00 | 3.00 | 0.00 |

Table A5: Counts of (Dis)Loyalty/(In)Competence for models in Table 2

| Loyalty/competence | N |
|---|---|
| Loyal, incompetent (LI) = 0 | 47 |
| Loyal, competent (LC) = 1 | 137 |
| Disloyal, competent (DC) = 2 | 5 |
| Disloyal, incompetent (DI) = 3 | 9 |

# C Robustness checks: Alternative Competence Indicators

## C.1 Table (A) 2, but with governor school proxy

| | (1) | (2) |
|---|---|---|
| Disloyal | -0.187** | -0.070 |
| | (0.081) | (0.117) |
| Competent | -0.135 | -0.138 |
| | (0.151) | (0.152) |
| Changes in protest | | 1.246*** |
| | | (0.289) |
| | | (0.000) |
| Disloyal#Changes in protest | | -0.805** |
| | | (0.395) |
| Time FE | Yes | Yes |
| Federal District FE | Yes | Yes |
| Constant | 0.125* | -0.060 |
| | (0.064) | (0.086) |
| Observations | 198 | 198 |
| R-squared | 0.207 | 0.215 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

## C.2 Table (A) 1, but with governor school proxy

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Disloyal | -0.080* | | -0.117 | |
| | (0.043) | | (0.087) | |
| Competent | -0.020 | | -0.042 | |
| | (0.058) | | (0.059) | |
| *Disloyal & Competent* | | | | |
| LI | | 0.097*** | | 0.091*** |
| | | (0.028) | | (0.028) |
| LC | | 0.076 | | 0.102 |
| | | (0.067) | | (0.069) |
| DI | | 0.017 | | 0.082* |
| | | (0.049) | | (0.049) |
| LI X Navalny months | | | | 0.329*** |
| | | | | (0.118) |
| LC x Navalny months | | | | 0.000 |
| | | | | (0.000) |
| DI X Navalny months | | | | 0.132 |
| | | | | (0.229) |
| Year FE | 0.038 | 0.038 | 0.056 | 0.037 |
| | (0.035) | (0.036) | (0.038) | (0.036) |
| Navalny months | 0.341*** | 0.341*** | 0.346*** | 0.036 |
| | (0.051) | (0.051) | (0.052) | (0.118) |
| Lagged unauthorized | | | 0.347*** | |
| | | | (0.111) | |
| Disloyal X Lagged unauthorized | | | 0.117 | |
| | | | (0.311) | |
| Constant | 0.068** | -0.029 | -0.026 | -0.028 |
| | (0.028) | (0.030) | (0.041) | (0.030) |
| Observations | 1,245 | 1,245 | 1,162 | 1,245 |
| R-squared | 0.094 | 0.094 | 0.098 | 0.098 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

## C.3 Table (A)1, but with business school proxy

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Disloyal | -0.092** | | -0.130 | |
| | (0.043) | | (0.088) | |
| Competent | -0.066** | | -0.074** | |
| | (0.028) | | (0.030) | |
| *Disloyal/Competent (DC)* | | | | |
| Loyal/Incompetent (LI) | | 0.110 | | 0.018 |
| | | (0.084) | | (0.088) |
| Loyal/Competent (LC) | | 0.042 | | -0.041 |
| | | (0.087) | | (0.090) |
| Disloyal/ Incompetent (DI) | | 0.006 | | -0.031 |
| | | (0.095) | | (0.098) |
| LI X Navalny months | | | | 0.453*** |
| | | | | (0.108) |
| LC X Navalny months | | | | 0.406*** |
| | | | | (0.115) |
| DI X Navalny months | | | | 0.153 |
| | | | | (0.149) |
| Navalny days | 0.342*** | 0.342*** | 0.347*** | -0.074 |
| | (0.051) | (0.051) | (0.052) | (0.082) |
| Lagged repression | | | 0.348*** | |
| | | | (0.110) | |
| Disloyal X Lagged repression | | | 0.106 | |
| | | | (0.311) | |
| Constant | 0.091*** | -0.016 | 0.000 | 0.069 |
| | (0.031) | (0.089) | (0.043) | (0.092) |
| Observations | 1,245 | 1,245 | 1,162 | 1,245 |
| R-squared | 0.097 | 0.097 | 0.102 | 0.101 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

## C.4 Table (A) 2, but with business school proxy

| | (1) | (2) |
|---|---|---|
| Disloyal | -0.191** | -0.073 |
| | (0.081) | (0.116) |
| Competent | -0.033 | -0.037 |
| | (0.059) | (0.059) |
| Changes in protest | | 1.231*** |
| | | (0.288) |
| Disloyal#Changes in protest | | -0.814** |
| | | (0.392) |
| | (0.070) | |
| Time FE | Yes | Yes |
| Federal District FE | Yes | Yes |
| Constant | 0.137** | -0.044 |
| | (0.068) | (0.090) |
| Observations | 198 | 198 |
| R-squared | 0.206 | 0.214 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

# Functionaries of Repression: Formal Proofs

Updated December 1, 2024

## RQ: When will bureaucratic agents of an authoritarian state repress protest actions?

Russian authorities require would-be protesters to apply for a permit to protest, indicating who, why, when, and where they will protest. These applications are reviewed and processed at a local or regional level by bureaucrats. In the case of Russia, it is the regional governor who acts as the Kremlin's agent in the approval/denial decision. Approval allows protest as planned, denial involves potential for enforcement if the protesters go ahead without legal permission. What informs when bureaucrats will comply with or defy orders to repress?

**Our Answer:** A loyal bureaucrat complies with repressive orders regardless of their competence. But asymmetric information creates a moral hazard. A competent, disloyal bureaucrat will defy orders under conditions when a leader will believe the average bureaucrat is loyal or incompetent, as when the distribution of bureaucrats in the country skews loyal and when shocks lead to protests being outside of bureaucratic control.

## Scope Conditions

The model explains the bureaucrat's decision to deny or allow anti-regime protests and when the autocrat will punish bureaucrats in a repressive state. Applies in the following conditions:

- bureaucrat can make a repressive choice
- bureaucrat has some informational advantage
- bureaucrat can be punished by the autocratic central government
- bureaucrat may have some amount of preference divergence from the autocrat
- bureaucrat can be punished to a degree that they strictly prefer to avoid at all costs

# Model Assumptions

We present a delegation model with two players: a principal ($A$) (autocratic regime) and an agent ($B$) (regional or local government/bureaucrat).

Ex ante, A does not know whether the bureaucrat is competent or incompetent, does not know whether the bureaucrat is loyal or opposed to the autocrat, and does not know the outcome of the shock/noise (though it does know what size it would take if realized $\epsilon$). A cares less about the exact type of bureaucrat as long as whoever is there minimizes protest.

The bureaucrat signals their competence and loyalty by complying with an order to repress.

B wants to retain office/avoid punishment but diverges from the regime in preferred protest outcomes because they are ideologically distinct from the regime. This is represented as goal conflict or divergent preferences.

# Parameters and variables

| Parameter | Assumptions | Followed by conceptual definition |
|---|---|---|
| $\phi$ | $0<\phi<1$ | |

Probability the bureaucrat is competent and can accurately determine the realization of shock $\omega$

| | |
|---|---|
| $\gamma$ | $0<\gamma<1$ |

Probability the bureaucrat is disloyal and has a preference to approve some positive amount of protest to reach their ideal point of $x_B$. With probability $\gamma$ the bureaucrat's ideal point is not equal to the autocrat's ideal point of 0 (so $x_B>0$) and with probability $1-\gamma$ the bureaucrat is loyal ($x_B = 0$) or disloyal ($x_B = \epsilon$).

| | |
|---|---|
| x | $x\in[0,\infty)$ ; $x=a^*+\omega$ |

The outcome of the approve/deny choice--how much protest the autocrat observes after the bureaucrat's decision, a value in $\mathbb{R}$. The regime's ideal point is $x_A$, normalized to $x_A = 0$. The agent's ideal point is $x_B \in \{0, \epsilon\}$.

| | |
|---|---|
| $\rho$ | $\rho\in x\in[0,\epsilon]$ |

The autocrat's chosen punishment strategy, which is the maximum amount of protest that the regime will allow before punishing the bureaucrat. It can take one of two values: tolerating no positive protest or tolerating the amount of protest that is unavoidable due to the shock.

a $a \in [0,\infty)$

The action that the bureaucrat takes--an amount of protest it allows to occur via its approval powers.

$\omega$ $\omega \in \{0,\epsilon\}$

A random shock that introduces noise into the interaction. Protest may occur regardless of the bureaucrat's actions or it might not. This outcome is unknown to A.

$\epsilon$ $\epsilon > 0$

The amount of protest that will occur outside of the bureaucrat's action a due to the shock resulting in non-zero levels of protest. A knows the value of $\epsilon$, but not whether it occurred ($\omega$).

$c$ $c > 0$

The cost to the autocrat of punishing a bureaucrat: ($c_A$) in the paper

$k$ $k = \infty$

The cost to the bureaucrat of being punished: ($c_B$) in the paper

# Sequence of Moves

1. Nature draws the level of the bureaucrat's **competence**, which is a binary state (B is competent and can accurately observe $\omega$, or incompetent and cannot), where B is $B_C$ with probability $\phi$ and $B_I$ with probability (1-$\phi$).
2. Nature also draws the level of the bureaucrat's **loyalty** or alignment, which is a binary state (B is loyal $x_B = 0$ or disloyal/opposed $x_B \geq 0$), where B is $B_D$ with probability ($\gamma$) and $B_L$ with probability (1-$\gamma$).
3. The autocrat sets a **delegation rule $\rho$,** which is a level of protest (x) that A will allow, above which it will punish the bureaucrat for the protest outcome (whether or not it was their fault).
4. Nature draws the **shock** that creates a noisy signal or agency loss with some unavoidable protest occurring without approval, where the probability that $\omega = \epsilon$ is represented by $0 \leq \theta \leq 1$, and $\omega = 0$ with probability 1-$\theta$. The autocrat, A, does not know the result of Nature's draws in steps 1, 2, and 4.
5. The bureaucrat, B, decides **how much anti-regime protest to approve** in equilibrium, represented as a point $a^*$ on the real number line $x$. This effort is conveyed to the autocrat with noise $\omega \in \{0, \epsilon\}$, so the realization of $a^*$is $x = a^* + \omega$.
6. The autocrat, A, carries out the delegation rule whether to **punish or retain** the incumbent bureaucrat, where replacing involves a cost of effort $c_A$ to find the best replacement. The bureaucrat's utility for being replaced is $c_B$. We use c and k, respectively, for simplicity in this file.

# Utility Functions

$EU_A := -(x - 0)^2 + 1(\Delta = P)(-c)$

$EU_A := -((a + \omega) - 0)^2 + 1(\Delta = P)(-c)$

$EU_B := -((a + \omega) - x_B)^2 + 1(\Delta = P)(-k)$

# Equilibrium

## Bureaucrat strategic utility maximization

### Loyal bureaucrat best response to any punishment rule

Identify an eqm where bureaucrats can choose one of two levels of repression: no protest (loyal) or some protest $\epsilon$ (disloyal). Not a continuous choice rule (makes things complicated!). The bureaucrat incurs a cost of $-\epsilon^2$ if they are loyal but protest is $\epsilon$ or if they are disloyal and protest is 0

### Loyal bureaucrats: Assume the autocratic regime has set a RESTRICTIVE punishment rule of $\rho$=0

When a bureaucrat is **incompetent and loyal ($B_{IL}$),** they cannot observe the shock, but they do genuinely set a policy as close to the autocrat's (and their own) preference as possible **($a^*_{IL}$=0)**. The *realization* of that action is x=0 if B is lucky ($\omega$=0) or x=$\epsilon$ if B is unlucky.

```
Reduce[-((0 + θ * ϵ) - 0)^2 + θ * (-k) > -((a + θ * ϵ) - 0)^2 + θ * (-k) &&
    a > 0 && 0 < θ < 1 && ϵ > 0 && k = ∞, a]
```

Out[ ]=

$\epsilon > 0 \&\& 0 < \theta < 1 \&\& k > 0 \&\& a > 0$

$B_{IL}$ is always better off choosing **($a^*_{IL}$=0)** for all parameter values.

When a **bureaucrat is competent and loyal ($B_{CL}$),** they can observe the shock, but it doesn't change their preference to deny all protests **($a^*_{CL}$=0)**. Nevertheless, the autocrat observes the *realization* of that action as x=0 if B is lucky ($\omega$=0) or x=$\epsilon$ if B is unlucky.

**When $\omega$=0**

```
Reduce[-((0 + 0) - 0)^2 + θ * (-k) > -((a + 0) - 0)^2 + θ * (-k) &&
   a > 0 && 0 < θ < 1 && ϵ > 0 && k > ∞, a]
```

Out[ ]=

$0 < \theta < 1 \&\& \epsilon > 0 \&\& k > 0 \&\& a > 0$

**When $\omega=\epsilon$**

```
Reduce[-((0 + ϵ) - 0)^2 > -((a + ϵ) - 0)^2 + θ * (-k) && a > 0 && 0 < θ < 1 && ϵ > 0 && k > ∞, a]
```

Out[ ]=

$\epsilon > 0 \&\& 0 < \theta < 1 \&\& k > 0 \&\& a > 0$

$B_{CL}$ is always better off choosing **$(a^*_{CL}=0)$** for all parameter values, regardless of the realization of the shock.

## Loyal bureaucrats: Assume the autocratic regime has set a LENIENT punishment rule of $\rho=\epsilon$

When a bureaucrat is **incompetent and loyal ($B_{IL}$),** they cannot observe the shock, but they do genuinely set a policy as close to the autocrat's (and their own) preference as possible **$(a^*_{IL}=0)$**. The *realization* of that action is x=0 if B is lucky ($\omega$=0) or x=$\epsilon$ if B is unlucky. *Same utility functions as above.*

In[ ]:=
```
Reduce[-((0 + θ * ϵ) - 0)^2 + θ * (-k) > -((a + θ * ϵ) - 0)^2 + θ * (-k) &&
  a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0, a]
```

Out[ ]=

$\epsilon > 0 \&\& 0 < \theta < 1 \&\& k > 0 \&\& a > 0$

$B_{IL}$ is always better off choosing **$(a^*_{IL}=0)$** for all parameter values.

When a **bureaucrat is competent and loyal ($B_{CL}$),** they can observe the shock, but it doesn't change their preference to deny all protests **$(a^*_{CL}=0)$**. Nevertheless, the autocrat observes the *realization* of that action as x=0 if B is lucky ($\omega$=0) or x=$\epsilon$ if B is unlucky.

**When $\omega=0$**

In[ ]:=
```
Reduce[-((0 + 0) - 0)^2 > -((a + 0) - 0)^2 + θ * (-k) && a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0, a]
```

Out[ ]=

$\epsilon > 0 \&\& k > 0 \&\& 0 < \theta < 1 \&\& a > 0$

**When $\omega=\epsilon$**

In[ ]:=
```
Reduce[-((0 + ϵ) - 0)^2 + θ * (-k) > -((a + ϵ) - 0)^2 + θ * (-k) &&
  a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0, a]
```

Out[ ]=

$0 < \theta < 1 \&\& \epsilon > 0 \&\& k > 0 \&\& a > 0$

$B_{CL}$ is always better off choosing **$(a^*_{CL}=0)$** for all parameter values, regardless of the realization of the shock.

All loyal bureaucrats set a=0, regardless of the punishment rule or protest outcome, playing true to type. (This is why A likes them so much.) Notably, though, **loyal bureaucrats cannot signal competence through their behaviors**, since their best response is the same as the incompetent bureaucrats.

Thus, the autocrat is indifferent between a competent bureaucrat and an incompetent bureaucrat, as

long as they are loyal, because they will deny as much protest as it is possible to deny.

**Implication B1a (loyalty):** A loyal bureaucrat will always repress under any punishment rule.

## Disloyal bureaucrat best response to RESTRICTIVE punishment rule, $\rho$=0

### Incompetent and disloyal: Lottery over shock realization

When a bureaucrat is **incompetent and disloyal ($B_{ID}$)**, they cannot observe the shock, but they prefer for protest to be $\epsilon$ and avoid being punished (-k). What action (a) optimizes $B_{ID}$'s utility, given the lottery over shock realization?

```
In[•]:= Maximize[{-((a + θ * ϵ) - ϵ)^2 + (-k), a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
```

```
Out[•]=
{ { -k   ϵ > 0 && 0 < θ < 1 && k > 0 } , { a → { ϵ - ϵ θ          ϵ > 0 && 0 < θ < 1 && k > 0 } } }
  { -∞   True                                  Indeterminate  True                                }
```

```
In[•]:= Reduce[ϵ - ϵ θ > 0 && a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0, a]
```

```
Out[•]=
ϵ > 0 && 0 < θ < 1 && k > 0 && a > 0
```

The optimal positive a that the bureaucrat could set (a=$\epsilon$-$\epsilon$ $\theta$) accounts for the expected value of the shock lottery. When will $B_{ID}$ be better off following orders and choosing a=0 (with $\theta$ risk of punishment) instead of the optimal positive a and certain punishment under the restrictive rule?

```
In[•]:= Reduce[-((0 + θ * ϵ) - ϵ)^2 + θ * (-k) > -((ϵ - ϵ θ + θ * ϵ) - ϵ)^2 + (-k) &&
   0 < θ < 1 && ϵ > 0 && k > 0, k, Reals]
```

```
Out[•]=
ϵ > 0 && 0 < θ < 1 && k > ϵ^2 - ϵ^2 θ
```

```
In[•]:= Reduce[ϵ^2 - ϵ^2 θ > 0 && 0 < θ < 1 && ϵ > 0 && k > 0]
```

```
Out[•]=
ϵ > 0 && 0 < θ < 1 && k > 0
```

**$B_{ID}$ is better off repressing--choosing ($a^*_{ID}$=0)--when the cost they would incur for punishment is sufficiently high ($k > \epsilon^2 - \epsilon^2 \theta$) under the restrictive rule.**

### Competent and disloyal: Observes shock realization

If the bureaucrat is **disloyal and competent ($B_{CD}$)**, they can observe the realization of $\theta$: whether they were lucky ($\omega$=0) or unlucky ($\omega$=$\epsilon$) in the shock.

**When $\omega$=0,**
positive a will be punished under the restrictive rule.

```
In[•]:= Maximize[{-((a) - ϵ)^2 + (-k), a ≥ 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
```

```
Out[•]=
{{-k   0 < θ < 1 && ϵ > 0 && k > 0}, {a → {ϵ              0 < θ < 1 && ϵ > 0 && k > 0}}}
 {-∞   True                          {Indeterminate  True                              }}
```

So when will $B_{CD}$ choose a=0 to avoid punishment rather than their ideal protest outcome?

```
In[•]:= Reduce[-((0) - ϵ)^2 > -(ϵ - ϵ)^2 + (-k) && 0 < θ < 1 && ϵ > 0 && k > 0]
```

```
Out[•]=
0 < θ < 1 && ϵ > 0 && k > ϵ^2
```

Because any positive a will invoke the regime's punishment, $B_{CD}$'s best response to $\omega$=0 is to **set a=0 and avoid punishment for all $k > \epsilon^2$** and their ideal point when punishment is less costly to them than the squared distance between their ideal point and 0.

```
In[•]:= Reduce[ϵ^2 > ϵ^2 - ϵ^2 θ && ϵ > 0 && 0 < θ < 1]
```

```
Out[•]=
ϵ > 0 && 0 < θ < 1
```

$\epsilon^2$ is always greater than $\epsilon^2 - \epsilon^2\,\theta$. The CD therefore always allows protest under more conditions than ID under the restrictive rule.

**When $\omega=\epsilon$,**
all actions are punished.

```
In[•]:= Maximize[{-((a + ϵ) - ϵ)^2 + (-k), a ≥ 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
```

```
Out[•]=
{{-k   0 < θ < 1 && ϵ > 0 && k > 0}, {a → {0              0 < θ < 1 && ϵ > 0 && k > 0}}}
 {-∞   True                          {Indeterminate  True                              }}
```

The competent, disloyal bureaucrat will **always set a=0 upon observing $\omega=\epsilon$**, under the restrictive punishment rule, absorbing the punishment but allowing the protest that they prefer. Punishment is unavoidable.

## Disloyal bureaucrat best response to LENIENT punishment rule, $\rho=\epsilon$

### Incompetent and disloyal: Lottery over shock realization

When a bureaucrat is **incompetent and disloyal ($B_{ID}$)**, they cannot observe the shock, but they prefer to set a policy as close to their opposed preference as possible and still avoid being punished (-k). What non-zero action (a) optimizes $B_{ID}$'s utility, given the lottery over shock realization?

```
In[•]:= Maximize[{-((a + θ * ϵ) - ϵ)^2 + θ * (-k), a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
```

```
Out[•]=
{{-k θ   ϵ > 0 && 0 < θ < 1 && k > 0}, {a → {ϵ - ϵ θ          ϵ > 0 && 0 < θ < 1 && k > 0}}}
 {-∞     True                          {Indeterminate  True                               }}
```

The optimal positive a that the bureaucrat could set **($a=\epsilon-\epsilon\,\theta$)** accounts for the value (expected utility) of the shock lottery (just like under the restrictive rule). When will $B_{ID}$ be better off following orders

and choosing a=0 instead? Notably, under the more lenient rule, the incompetent disloyal bureaucrat can avoid punishment with certainty by setting 0, even if $\omega$ realizes as $\epsilon$. But choosing a positive a will be punished IF $\omega$=$\epsilon$. So the inequality is EU(a=0; no punishment) > EU(a=x-$\epsilon\,\theta$; probabilistic punishment):

```
In[•]:= Reduce[
  -((0 + θ * ϵ) - ϵ) ^ 2 > -((ϵ - ϵ θ) + θ * ϵ - ϵ) ^ 2 + θ * (-k) && 0 < θ < 1 && ϵ > 0 && k > 0, Reals]
```

Out[•]=

$$\epsilon > 0 \;\&\&\; 0 < \theta < 1 \;\&\&\; k > \frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta}$$

```
In[•]:= Reduce[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ > 0 && 0 < θ < 1 && ϵ > 0 && k > 0]
```

Out[•]=

$$\epsilon > 0 \;\&\&\; 0 < \theta < 1 \;\&\&\; k > 0$$

$B_{ID}$ is better off choosing **($a^*_{ID}$=0)** when the cost they would incur for punishment is sufficiently high ($k > \frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta}$) under the lenient rule.

## Implication B2b ($B_{ID}$ and the conditional effect of the likelihood of the shock): An incompetent disloyal bureaucrat represses more under the restrictive rule than the lenient rule when the probability of a positive shock is low, but represses more under the lenient rule than the restrictive rule when the probability of a positive shock is high.

```
In[•]:= Reduce[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ > ϵ^2 - ϵ^2 θ && 0 < θ < 1 && ϵ > 0 && k > 0]
```

Out[•]=

$$\epsilon > 0 \;\&\&\; 0 < \theta < \frac{1}{2} \;\&\&\; k > 0$$

**Interesting comparative static:** This punishment threshold is greater than the punishment threshold for the same bureaucrat type under the restrictive rule when $\theta$ is low. This implies that $B_{ID}$ represses LESS often (a=0) and defies more often under the lenient rule than under the restrictive one when the likelihood of $\omega$=$\epsilon$ (stochastic protest) is low $0 < \theta < \frac{1}{2}$.

In contrast, $B_{ID}$ represses MORE often under the lenient rule than the restrictive rule when $\theta$ is high, because they expect likely punishment in that condition and can avoid it by setting a=0.

## Competent and disloyal: Observes shock realization

If the bureaucrat is **disloyal and competent ($B_{CD}$)**, they can observe the realization of $p$ whether they were lucky ($\omega$=0) or unlucky ($\omega$=$\epsilon$) in the shock.

**When $\omega$=0:**

```
In[•]:= Maximize[{-((a) - ϵ)^2, a ≥ 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
Out[•]=
{ { 0    0 < θ < 1 && ϵ > 0 && k > 0 } , { a → { ϵ                0 < θ < 1 && ϵ > 0 && k > 0 } } }
  { -∞   True                           }   { { Indeterminate  True                           } }
```

So when will $B_{CD}$ choose a=0 rather than their ideal protest outcome?

```
In[•]:= Reduce[-((0) - ϵ)^2 > -(ϵ - ϵ)^2 && 0 < θ < 1 && ϵ > 0 && k > 0]
Out[•]=
False
```

The competent, disloyal bureaucrat **ALWAYS will choose their ideal outcome** when the shock yields no protest. This is where the CD bureaucrat leverages their informational advantage and invokes the moral hazard. They will set $(a^*_{CD} \mid \omega = 0) = \epsilon$, to avoid punishment, which *approves protest that was not random and that the autocrat would prefer to deny* because it's controllable. This is the outcome the autocrat does not want.

**When $\omega=\epsilon$,** any amount of additional protest will invoke punishment under the lenient rule:

```
In[•]:= Maximize[{-((a + ϵ) - ϵ)^2 + (-k), a > 0 && 0 < θ < 1 && ϵ > 0 && k > 0}, a]
Out[•]=
{ { -k   ϵ > 0 && 0 < θ < 1 && k > 0 } , {a → Indeterminate} }
  { -∞   True                        }
```

So when will $B_{CD}$ choose a=0 rather than any positive a?

```
In[•]:= Reduce[-((0 + ϵ) - ϵ)^2 > -(((ϵ - ϵ) + ϵ) - ϵ)^2 + (-k) && 0 < θ < 1 && ϵ > 0 && k > 0, k]
Out[•]=
0 < θ < 1 && ϵ > 0 && k > 0
```

**$B_{CD}$ always represses (a=0) when $\omega=\epsilon$.**

## **Implication B1b (loyalty):** A loyal bureaucrat represses more than a disloyal bureaucrat.

A loyal bureaucrat never approves. Since the loyal one always represses and the disloyal one does only under some circumstances, Implication B1.

## **Implication B2a (competence):** A competent bureaucrat represses less than an incompetent bureaucrat.

Verified with computational simulation to identify patterns in eqm overall.

If we assume

$$k > \text{Max}\left[\frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta},\ \epsilon^2,\ \epsilon^2 - \epsilon^2\,\theta\right]$$

all types of bureaucrats want to avoid punishment at all cost. In order, these cutpoints are the punishment thresholds above which each type of bureaucrat under each rule type will always want to avoid punishment: for restrictive $B_{ID}$, restrictive $B_{CD}$, and lenient $B_{ID}$. This is a note for reference, because we do not assume this to be the case in the article.

If we do not assume k exceeds all three thresholds, we learn which types are more willing to accept punishment than the others.

Take comparative statics on k''', which correlates with k'.

In[•]:=
```
Unset[θ]
```

In[•]:=
```
k* := ϵ^2 - ϵ^2 θ
```

In[•]:=
```
k** := (ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ
```

## Implication B3: The disloyal (and average) bureaucrat is **less** likely to repress protest as the **size of the ungovernable protest** ($\epsilon$) increases.

To see this, take the derivative of $k^*$ wrt $\epsilon$:

In[•]:=
```
D[ϵ^2 - ϵ^2 θ, ϵ]
```

Out[•]=

$$2\,\epsilon - 2\,\epsilon\,\theta$$

Which is strictly increasing:

In[•]:=
```
Reduce[% > 0 && 0 < θ < 1 && ϵ > 0]
```

Out[•]=

$$\epsilon > 0 \;\&\&\; 0 < \theta < 1$$

and the derivative of $k^{**}$ wrt $\epsilon$:

In[•]:=
```
D[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ, ϵ]
```

Out[•]=

$$\frac{2\,\epsilon - 4\,\epsilon\,\theta + 2\,\epsilon\,\theta^2}{\theta}$$

Which is strictly increasing:

In[•]:=
```
Reduce[% > 0 && 0 < θ < 1 && ϵ > 0]
```

Out[•]=

$$\epsilon > 0 \;\&\&\; 0 < \theta < 1$$

Since the values of k BELOW these cutpoint will lead incompetent bureaucrats to allow protest,

increasing the cutpoint means a bureaucrat will be more likely to ALLOW (less likely to repress) protests.

Figures illustrate this intuitions as well: moving to the right on the x-axis opens more equilibrium space where disloyal bureaucrats will allow protest, even sometimes under restrictive punishment rules.

## Implication B5: The disloyal (and average) bureaucrat is **more** likely to repress protest as the **probability of the ungovernable protest** ($\theta$) increases.

To see this, take the derivative of $k^*$ wrt $\theta$:

```
In[•]:= D[ϵ^2 - ϵ^2 θ, θ]
```

```
Out[•]=
-ϵ^2
```

Which is strictly decreasing:

```
In[•]:= Reduce[% < 0 && 0 < θ < 1 && ϵ > 0]
```

```
Out[•]=
0 < θ < 1 && ϵ > 0
```

and the derivative of $k^{**}$ wrt $\theta$:

```
In[•]:= D[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ, θ]
```

```
Out[•]=
(-2 ϵ^2 + 2 ϵ^2 θ)/θ - (ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ^2
```

Which is strictly decreasing:

```
In[•]:= Reduce[% < 0 && 0 < θ < 1 && ϵ > 0]
```

```
Out[•]=
ϵ > 0 && 0 < θ < 1
```

Since the values of k BELOW this cutpoint will lead incompetent bureaucrats to allow protest, increasing the cutpoint means a bureaucrat will be less likely to ALLOW (more likely to repress) protests.

Figures illustrate this intuitions as well: moving to the right on the x-axis opens more equilibrium space where disloyal bureaucrats will allow protest, even sometimes under restrictive punishment rules.

## Figures

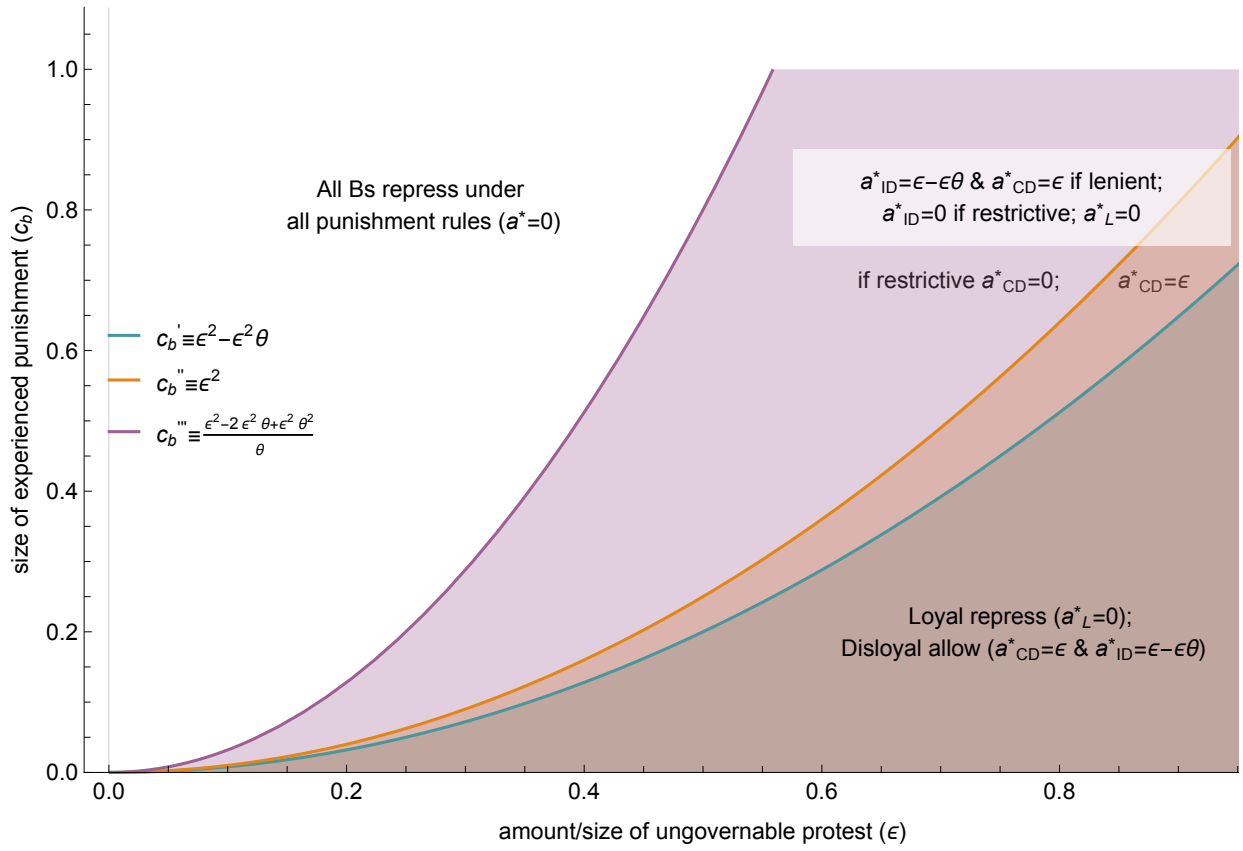
In[ ]:=
```
θ = .2
```

Out[ ]=
```
0.2
```

In[ ]:=
```
Unset[all]
```

In[•]:=
```
Plot[{ϵ^2 - ϵ^2 θ, Callout[ϵ^2, "a*ID=ϵ-ϵθ & a*CD=ϵ if lenient;
a*ID=0 if restrictive; a*L=0", {.8, .75}, Appearance → None],
  Callout[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ, "All Bs repress under
all punishment rules (a*=0)", {.255, .75}, Appearance → None]},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific",
 AxesLabel → {Style["γ", 12], Style["ϵ", 12]}, LabelStyle → {12, GrayLevel[0]},
 PlotRange → {0, 1}, Frame → {True, True, False, False},
 FrameLabel → {"amount/size of ungovernable protest (ϵ)",
   "size of experienced punishment (cb)", "", ""}, Filling → Bottom, Prolog →
  {Text[Style["if restrictive a*CD=0;          a*CD=ϵ", FontSize → 12], {.77, .7}]},
 Epilog → {Text[Style["Loyal repress (a*L=0);
Disloyal allow (a*CD=ϵ & a*ID=ϵ-ϵθ)", FontSize → 12], {.77, .2}]}, PlotLegends →
  Placed[{"cb'≡ϵ^2-ϵ^2θ", "cb''≡ϵ^2", "cb'''≡(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ"}, {Left, Center}]]
```

Out[•]=



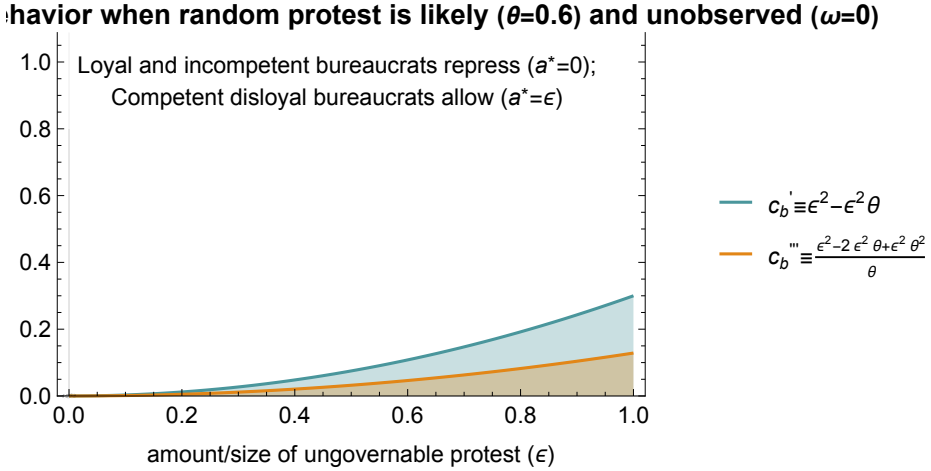

In[•]:=
```
θ = .7
```

Out[•]=
```
0.7
```

In[•]:=
```
Unset[θ]
```

In[ ]:=
```
Plot[{ϵ^2 - ϵ^2 θ,
  Callout[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ, "Loyal and incompetent bureaucrats repress (a*=0);
Competent disloyal bureaucrats allow (a*=ϵ)", {.2, .8}, Appearance → None]},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific",
 PlotLabel → Style["Bureaucrat behavior when random protest is likely
     (θ=0.6) and unobserved (ω=0)", Bold], PlotRange → {0, 1},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]},
 FrameLabel → {"amount/size of ungovernable protest (ϵ)",
   "size of experienced punishment (c_b)", "", ""},
 Filling → Bottom, Prolog → {Text[Style["a*_ID=ϵ-ϵθ (restrictive)
a*_ID=0 (lenient); a*_CD=ϵ", {.9, .17}]]},
 Epilog → {Text[Style["a*_CD=ϵ & a*_ID=ϵ-ϵθ", {.85, .05}]]},
 PlotLegends → {"c_b'≡ϵ^2-ϵ^2θ", "c_b'''≡(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ"}]
```

Out[ ]=



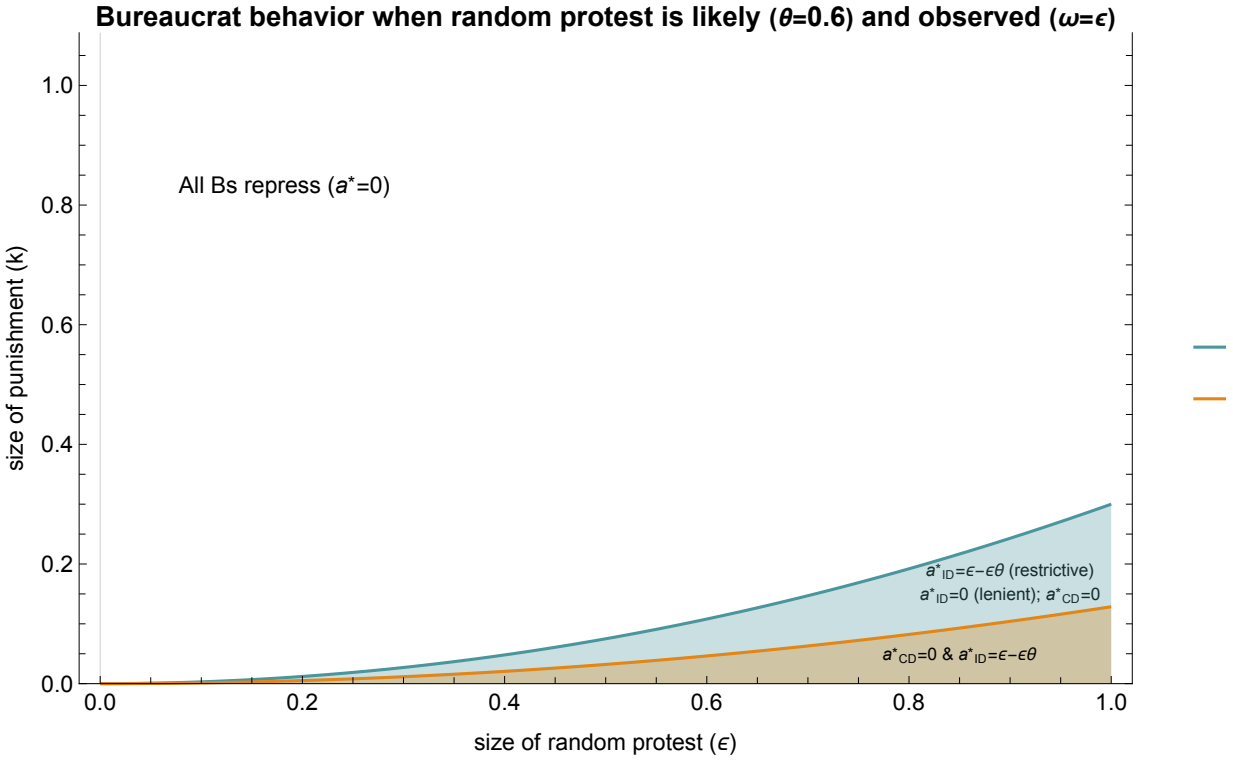

In[ ]:=
```
θ = .7
```

Out[ ]=
```
0.7
```

In[ ]:=
```
Unset[θ]
```

In[ ]:=
```
Plot[{ϵ^2 - ϵ^2 θ,
  Callout[(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ, "All Bs repress (a*=0)", {.2, .8}, Appearance → None]},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific",
 PlotLabel → Style["Bureaucrat behavior when random protest is
     likely (θ=0.6) and observed (ω=ϵ)", Bold], PlotRange → {0, 1},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]},
 FrameLabel → {"size of random protest (ϵ)", "size of punishment (k)", "", ""},
 Filling → Bottom, Prolog → {Text["a*ID=ϵ-ϵθ (restrictive)
a*ID=0 (lenient); a*CD=0", {.9, .17}]},
 Epilog → {Text["a*CD=0 & a*ID=ϵ-ϵθ", {.85, .05}]},
 PlotLegends → {"k=ϵ^2-ϵ^2θ", "k=(ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ"}]
```

Out[ ]=




# Autocrat enforcement node: Posterior beliefs about bureaucrat type after observing a protest outcome x∈{0,ϵ}

The autocrat stated the rule and the bureaucrat chose their best response to the rule in expectation that it would be carried out. The autocrat in the last stage decides whether to carry out the stated rule after updating its beliefs from the bureaucrat's behavior. Punishing the bureaucrat costs the regime *c* and retaining them means they'll expect similar behavior in another (unmodeled) period.

Recall (as solved above) that all loyal and incompetent disloyal bureaucrats all act the same way - they always repress and set a=0. The observed repression will vary based on the random shock, but a=0 is the regime's ideal action.

$x_{L\&ID} = \theta * \epsilon + (1-\theta) * 0$
$u_A(B_{L\&ID}) = \Theta * \left(-\epsilon^2 - c\right) + (1-\Theta) * 0$

The regime is therefore indifferent across $B_{IL}$, $B_{CL}$, and $B_{ID}$, and wants to learn only whether the bureaucrat is competent and disloyal, which is the type it wants to fire. **The regime has no particular preference for loyalty beyond the desired protest outcome.**

A bureaucrat is of the undesirable type, CD, with probability $\phi(1-\gamma)$ and one of the desirable types with probability $1-(\phi(1-\gamma))$

## Restrictive rule (punish any observable protest greater than x=0)

### **If A observes x=0** under the restrictive rule, what is its posterior belief that it faces $B_{CD}$?

$$p(B_{CD} \mid x=0) = \frac{p(x=0 \mid B_{CD}) * p(B_{CD})}{p(x=0 \mid B_{CD}) * p(B_{CD}) + p(x=0 \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega$=0 is $1-\theta$. If $\omega$=0, all bureaucrat types will set x=0, because they want to avoid the restrictive punishment.

$$p(\omega=0 \ \& \ B_{CD} \mid x=0) = p(\omega=0 \mid x=0) * \frac{p(x=0 \mid B_{CD}) * p(B_{CD})}{p(x=0 \mid B_{CD}) * p(B_{CD}) + p(x=0 \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega=\epsilon$ is $\theta$. If this is the state of the world, the regime could not possibly observe x=0.

$$p(\omega=\epsilon \ \& \ B_{CD} \mid x=0) = p(\omega=\epsilon \mid x=0) = 0$$

In[ ]:=
```
Simplify[(1 - Θ) * (1 * ϕ * (1 - γ)) / (1 * ϕ * (1 - γ) + 1 * (1 - ϕ * (1 - γ))) + Θ * 0]
```

Out[ ]=
$$(-1+\gamma)\ (-1+\Theta)\ \phi$$

**So observing x=0 under the restrictive punishment rule tells the regime that the bureaucrat is competent and disloyal with posterior belief $p(B_{CD} \mid x=0)=(\gamma\text{-}1)\ (\theta\text{-}1)\ \phi$.**

### **If A observes x=$\epsilon$** under the restrictive rule, what is its posterior belief that it

### faces $B_{CD}$ with $x_B = \epsilon$?

$$p(B_{CD} \mid x=\epsilon) = \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

$$p(\omega=0 \ \& \ B_{CD} \mid x=\epsilon) = p(\omega=0) * \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

$$p(\omega=\epsilon \ \& \ B_{CD} \mid x=\epsilon) = p(\omega=\epsilon) * \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the SOW is $\omega$=0 is 1-$\theta$. If a CD bureaucrat observes $\omega$=0, it will set x=$\epsilon$, so the regime wouldn't observe 0. If $\omega$=$\epsilon$, then the regime would observe x=$\epsilon$ under any type of bureaucrat, so they cannot update over their type from this signal.

$$p(B_{CD} \mid x=\epsilon) = (1-\theta) * \left( \frac{1*\phi*(1-\gamma)}{1*\phi*(1-\gamma)+0*(1-\phi*(1-\gamma))} \right) + \theta * \left( \frac{1*\phi*(1-\gamma)}{1*\phi*(1-\gamma)+1*(1-\phi*(1-\gamma))} \right)$$

In[ ]:=
```
FullSimplify[
 (1 - θ) * (1 * ϕ * (1 - γ) / (1 * ϕ * (1 - γ) + 0 * (1 - ϕ * (1 - γ)))) + θ * (1 * ϕ * (1 - γ) / (1 * ϕ * (1 - γ) + 1 * (1 - ϕ * (1 - γ))))]
```

Out[ ]=
$$1 + \theta\ (-1 + \phi - \gamma\ \phi)$$

**So observing x=$\epsilon$ under the restrictive punishment rule, the regime believes that the bureaucrat is competent and disloyal with a preference for some protest $\epsilon$ with posterior belief $p(B_{CD} \mid x=\epsilon) = 1+\theta\,(\phi - \gamma\,\phi - 1)$.**

## Lenient rule (punish any observable protest greater than x=$\epsilon$)

### **If A observes x=0** under the lenient rule, what is its posterior belief that it faces $B_{CD}$?

$$p(B_{CD} \mid x=0) = \frac{p(x=0 \mid B_{CD}) * p(B_{CD})}{p(x=0 \mid B_{CD}) * p(B_{CD}) + p(x=0 \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega$=0 is 1-$\theta$. But if a CD bureaucrat observes $\omega$=0, it will set x to maximize its utility, which will be observed by the regime as $\epsilon$. So if A actually observes no protest (x=0), then it knows that the bureaucrat is not the CD type.

$$p(\omega=0 \ \& \ B_{CD} \mid x=0) = p(\omega=0 \mid x=0) * \frac{p(x=0 \mid B_{CD}) * p(B_{CD})}{p(x=0 \mid B_{CD}) * p(B_{CD}) + p(x=0 \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega$=$\epsilon$ is $\theta$. If this is the state of the world, the regime could not possibly observe x=0.

$$p(\omega = \epsilon \ \&\ B_{CD} \mid x = 0) = p(\omega = \epsilon \mid x = 0) = 0$$

In[ ]:=
```
Simplify[(1 - θ) * (0 * ϕ * (1 - γ) / (0 * ϕ * (1 - γ) + 1 * (1 - ϕ * (1 - γ)))) + θ * 0]
```

Out[ ]=
```
0
```

**So observing x=0 under the lenient punishment rule, the regime believes that the bureaucrat is one of the acceptable types and the state of the world is $\omega$=0 with certainty: p (B_CD | x = 0) = 0.**

## **If A observes x=$\epsilon$** under the lenient rule, what is its posterior belief that it faces $B_{CD}$?

$$p(B_{CD} \mid x = \epsilon) = \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega$=0 is 1-$\theta$. But if a CD bureaucrat observes $\omega$=0, it will set $a = x_B$ or a=$\epsilon$ to maximize its utility, which will be observed by the regime as $\epsilon$.

$$p(\omega = 0 \ \&\ B_{CD} \mid x = \epsilon) = p(\omega = 0) * \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

The probability that the state of the world is $\omega=\epsilon$ is $\theta$. If this is the state of the world, the regime cannot update over type.

$$p(\omega = \epsilon \ \&\ B_{CD} \mid x = \epsilon) = p(\omega = \epsilon) * \frac{p(x=\epsilon \mid B_{CD}) * p(B_{CD})}{p(x=\epsilon \mid B_{CD}) * p(B_{CD}) + p(x=\epsilon \mid \neg B_{CD}) * p(\neg B_{CD})}$$

$$p(B_{CD} \mid x = \epsilon) = (1 - \theta) * \left(\frac{1 * \phi * (1-\gamma)}{1 * \phi * (1-\gamma) + 0 * (1 - \phi * (1-\gamma))}\right) + \theta * \left(\frac{1 * \phi * (1-\gamma)}{1 * \phi * (1-\gamma) + 1 * (1 - \phi * (1-\gamma))}\right)$$

In[ ]:=
```
FullSimplify[(1 - θ) * (1 * ϕ * (1 - γ) / (1 * ϕ * (1 - γ) + 0 * (1 - ϕ * (1 - γ)))) + θ * (1 * ϕ * (1 - γ) / (1 * ϕ * (1 - γ) + 1 * (1 - ϕ * (1 - γ))))]
```

Out[ ]=
```
1 + θ (-1 + ϕ - γ ϕ)
```

**So observing x=$\epsilon$ under the restrictive punishment rule, the regime believes that the bureaucrat is competent and disloyal with posterior belief $p(B_{CD} \mid x = \epsilon) = 1+\theta(\phi - \gamma\,\phi - 1)$.**

---

# Autocrat enforcement node: Is it sequentially rational for

# the autocrat to carry out the punishment rule it set?

This is a single period game, but assume that the regime is weighing the cost it incurs for punishing and replacing a bureaucrat (c) against its expectation (based on the updated beliefs) that the bureaucrat it faces is a competent disloyal one that will continue its strategy in the future/next round.

## **If A observes x=0** under the restrictive rule:

Carrying out the punishment means keeping the bureaucrat, so the regime's expected utility of doing this rather than deviating to punish is the probability the bureaucrat is $B_{CD}$ times the expected utility of what the $B_{CD}$would do in the next round versus the cost of punishment & replacement:

In[ ]:=
```
Reduce[
 ((-1 + γ) (-1 + θ) ϕ) * (-(ϵ - 0)^2) > -c && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1 && c > 0 && ϵ > 0]
```

Out[ ]=

$$0 < \phi < 1 \&\& 0 < \theta < 1 \&\& 0 < \gamma < 1 \&\& \epsilon > 0 \&\& c > \epsilon^2 \phi - \gamma \epsilon^2 \phi - \epsilon^2 \theta \phi + \gamma \epsilon^2 \theta \phi$$

The autocrat would want to keep the bureaucrat (consistent with the punishment rule it set) when $c > \epsilon^2 \phi - \gamma \epsilon^2 \phi - \epsilon^2 \theta \phi + \gamma \epsilon^2 \theta \phi$.

## **If A observes x=$\epsilon$** under the restrictive rule:

Carrying out the punishment means punishing the bureaucrat, so a deviation would be to keep the bureaucrat:

In[ ]:=
```
Reduce[
 -c > (1 + θ (ϕ - γ ϕ - 1)) * (-(ϵ - 0)^2) && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1 && c > 0 && ϵ > 0]
```

Out[ ]=

$$0 < \phi < 1 \&\& 0 < \gamma < 1 \&\& 0 < \theta < 1 \&\& \epsilon > 0 \&\& 0 < c < \epsilon^2 - \epsilon^2 \theta + \epsilon^2 \theta \phi - \gamma \epsilon^2 \theta \phi$$

The autocrat would want to punish the bureaucrat (consistent with the punishment rule it set) when $c < \epsilon^2 - \epsilon^2 \theta + \epsilon^2 \theta \phi - \gamma \epsilon^2 \theta \phi$.

## When is enforcement of the restrictive rule sequentially rational?

In[ ]:=
```
θ = .2
ϕ = .3
γ = .9
```

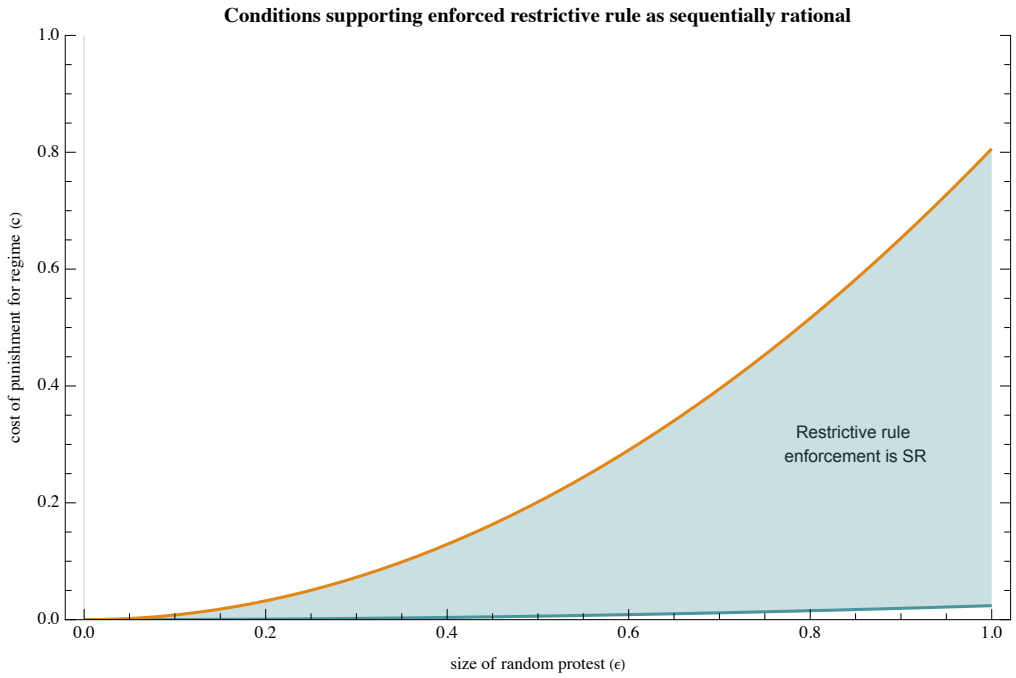
Out[ ]=
```
0.2
```

Out[ ]=
```
0.3
```

Out[ ]=
```
0.9
```

In[ ]:=
```
Plot[{ϵ^2 ϕ - γ ϵ^2 ϕ - ϵ^2 θ ϕ + γ ϵ^2 θ ϕ, ϵ^2 - ϵ^2 θ + ϵ^2 θ ϕ - γ ϵ^2 θ ϕ},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific", PlotLabel → Style[
   "Conditions supporting enforced restrictive rule as sequentially rational",
   Bold], PlotRange → {0, 1}, Frame → {True, True, False, True}, FrameLabel →
  {"size of random protest (ϵ)", "cost of punishment for regime (c)", "", ""},
 Filling → {1 → {2}}, Prolog → {Text["Restrictive rule
enforcement is SR", {.85, .3}]}]
```

Out[ ]=




In[ ]:=
```
Unset[θ]
Unset[ϕ]
Unset[γ]
```

## If A observes x=0 under the lenient rule:

Carrying out the punishment means keeping the bureaucrat, so the regime's expected utility of doing this rather than deviating to punish is the probability the bureaucrat is $B_{CD}$ times the expected utility of what the $B_{CD}$would do in the next round versus the cost of punishment & replacement:

In[ ]:=
```
Reduce[0 > -c && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1 && c > 0 && ϵ > 0]
```

Out[ ]=

$0 < \gamma < 1 \&\& 0 < \theta < 1 \&\& 0 < \phi < 1 \&\& c > 0 \&\& \epsilon > 0$

The autocrat would always want to keep the bureaucrat (consistent with the punishment rule it set) it observes x=0 under the lenient rule.

## If A observes x=ϵ under the lenient rule:

Carrying out the punishment means keeping the bureaucrat under the lenient rule, so a deviation would be to punish the bureaucrat:

In[•]:=
```
Reduce[
  (1 + θ (-1 + ϕ - γ ϕ)) * (-(ϵ - 0)^2) > -c && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1 && c > 0 && ϵ > 0]
```

Out[•]=
$$0 < \phi < 1 \&\& 0 < \gamma < 1 \&\& 0 < \theta < 1 \&\& \epsilon > 0 \&\& c > \epsilon^2 - \epsilon^2 \theta + \epsilon^2 \theta \phi - \gamma \epsilon^2 \theta \phi$$

The autocrat would want to keep the bureaucrat (consistent with the lenient punishment rule it set) when $c > \epsilon^2 - \epsilon^2 \theta + \epsilon^2 \theta \phi - \gamma \epsilon^2 \theta \phi$.

## When is enforcement of the restrictive rule sequentially rational?

In[•]:=
```
θ = .2
ϕ = .3
γ = .9
```

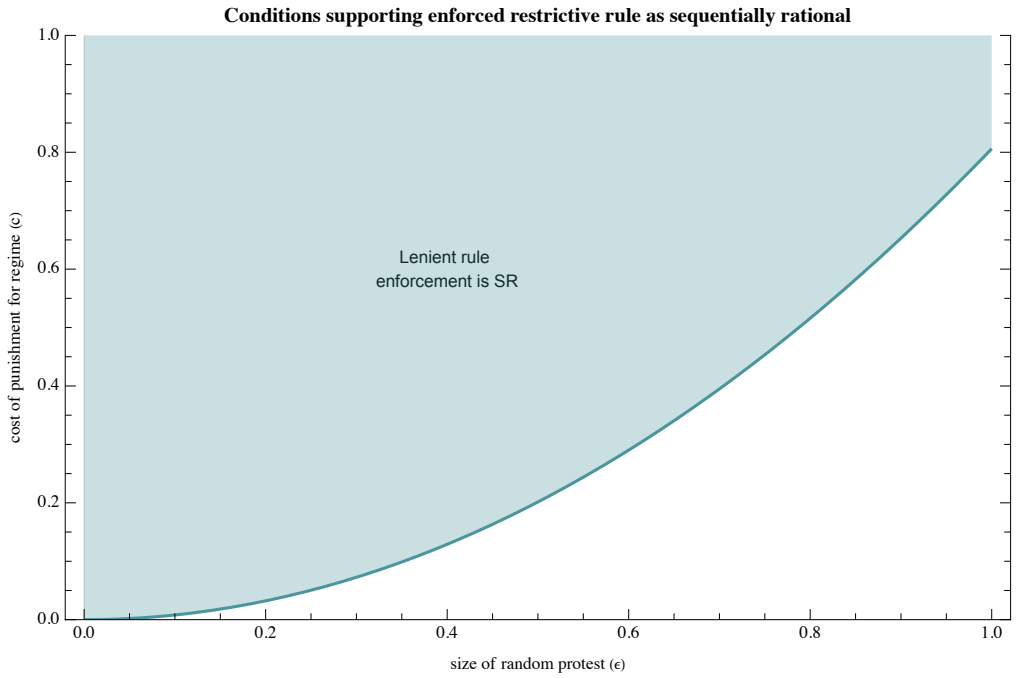
Out[•]=
```
0.2
```

Out[•]=
```
0.3
```

Out[•]=
```
0.9
```

In[ ]:=
```
Plot[{ϵ^2 - ϵ^2 θ + ϵ^2 θ ϕ - γ ϵ^2 θ ϕ}, {ϵ, 0, 1},
 PlotStyle → 98, PlotTheme → "Scientific", PlotLabel → Style[
   "Conditions supporting enforced restrictive rule as sequentially rational",
   Bold], PlotRange → {0, 1}, Frame → {True, True, False, True}, FrameLabel →
  {"size of random protest (ϵ)", "cost of punishment for regime (c)", "", ""},
 Filling → Top, Prolog → {Text["Lenient rule
enforcement is SR", {.4, .6}]}]
```

Out[ ]=




In[ ]:=
```
Unset[θ]
Unset[ϕ]
Unset[γ]
```

## When are the punishment rules sequentially rational?

In[ ]:=
```
θ = .2
ϕ = .3
γ = .9
```

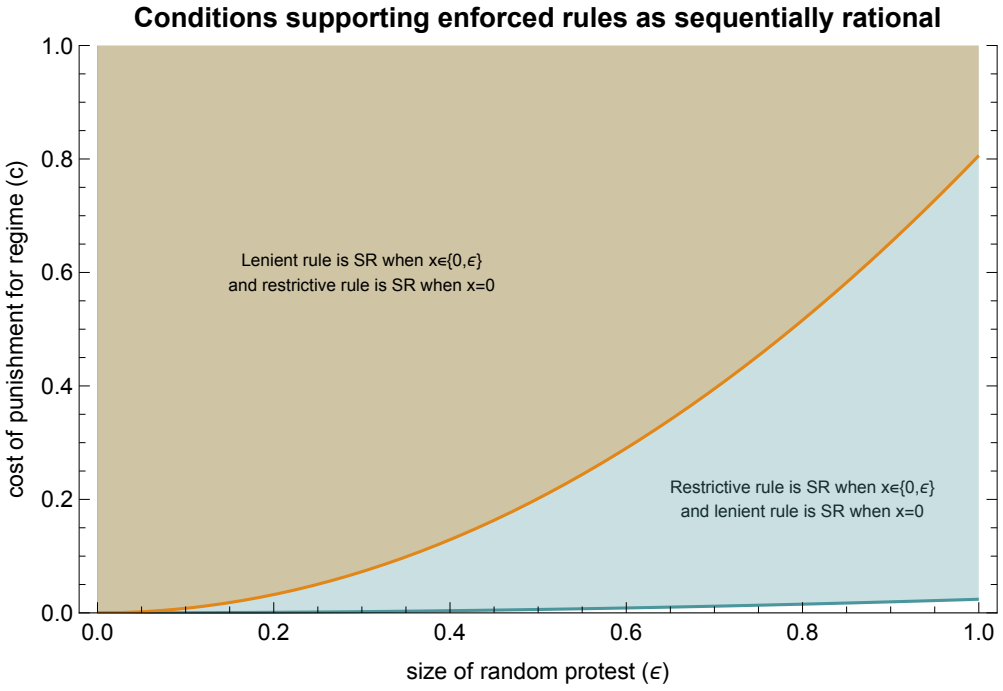
Out[ ]=
```
0.2
```

Out[ ]=
```
0.3
```

Out[ ]=
```
0.9
```

In[ ]:=
```
Plot[{ϵ^2 ϕ - γ ϵ^2 ϕ - ϵ^2 θ ϕ + γ ϵ^2 θ ϕ, ϵ^2 - ϵ^2 θ + ϵ^2 θ ϕ - γ ϵ^2 θ ϕ},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific", PlotLabel →
  Style["Conditions supporting enforced rules as sequentially rational", Bold],
 PlotRange → {0, 1}, Frame → {True, True, False, True}, FrameLabel →
  {"size of random protest (ϵ)", "cost of punishment for regime (c)", "", ""},
 LabelStyle → {12, GrayLevel[0]}, Filling → {Top},
 Prolog → {Text["Restrictive rule is SR when xϵ{0,ϵ}
and lenient rule is SR when x=0", {.8, .2}]},
 Epilog → {Text["Lenient rule is SR when xϵ{0,ϵ}
and restrictive rule is SR when x=0", {.3, .6}]}]
```

Out[ ]=




In[ ]:=
```
θ = .2
ϕ = .3
γ = .2
```

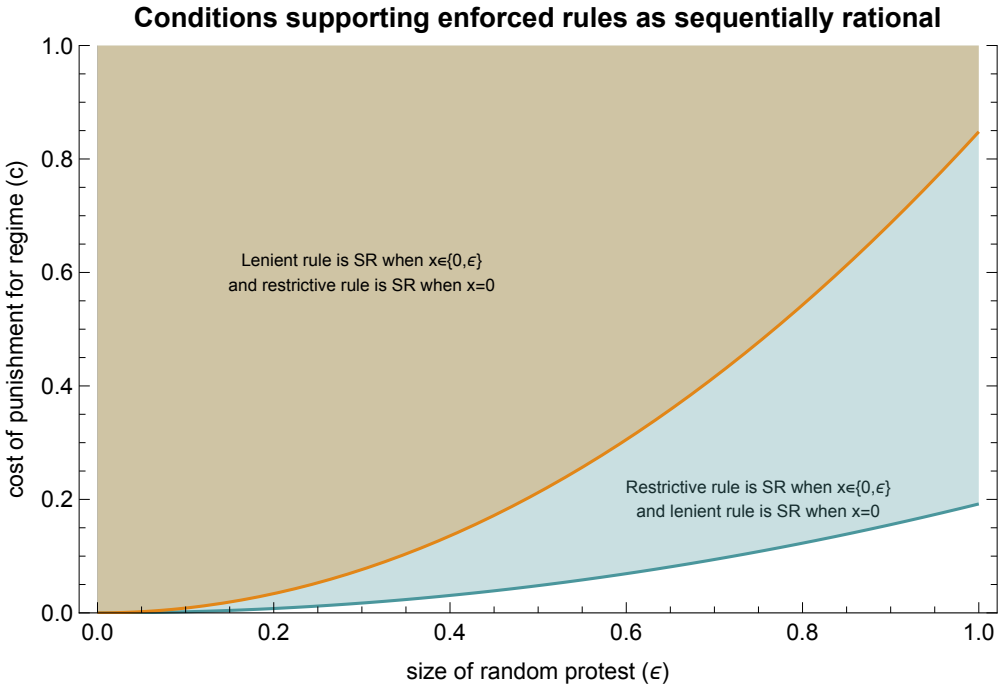
Out[ ]=
```
0.2
```

Out[ ]=
```
0.3
```

Out[ ]=
```
0.2
```

In[•]:=
```
Plot[{ϵ^2 ϕ - γ ϵ^2 ϕ - ϵ^2 θ ϕ + γ ϵ^2 θ ϕ, ϵ^2 - ϵ^2 θ + ϵ^2 θ ϕ - γ ϵ^2 θ ϕ},
 {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "Scientific", PlotLabel →
  Style["Conditions supporting enforced rules as sequentially rational", Bold],
 PlotRange → {0, 1}, Frame → {True, True, False, True}, FrameLabel →
  {"size of random protest (ϵ)", "cost of punishment for regime (c)", "", ""},
 LabelStyle → {12, GrayLevel[0]}, Filling → {Top},
 Prolog → {Text["Restrictive rule is SR when x∈{0,ϵ}
and lenient rule is SR when x=0", {.75, .2}]},
 Epilog → {Text["Lenient rule is SR when x∈{0,ϵ}
and restrictive rule is SR when x=0", {.3, .6}]}]
```

Out[•]=




In[•]:=
```
Unset[θ]
Unset[ϕ]
Unset[γ]
```

# Autocratic regime manipulates the punish threshold $\rho \in [0, \epsilon]$ to maximize their utility.

The final protest outcome x is determined by the bureaucrat' s choice and the realization of the shock. The autocratic regime wants to set a punishment threshold that will ferret out a disloyal bureaucrat. If the bureaucrat chooses a = 0, the possibility of unlucky error $\epsilon$ is not something the autocrat wants to punish. If the bureaucrat chooses anything greater than $\epsilon$, they reveal themselves to be disloyal and will be punished.

The autocratic regime's ideal point is x=0, and any distance from that ideal point is strictly worse for them under a quadratic loss function.

This means A's utility for any non-zero outcome x is $-(x-0)^2$, including if the bureaucrat represses as ordered (a=0) and the shock is realized as positive protest ($\omega = \epsilon$) $\rightarrow -(\epsilon - 0)^2 = -\epsilon^2$ (which is out of A's and B's control).

The autocrat has no incentive to set any rule that would allow more protest than the random shock, as it is made strictly worse off by doing so. To see this, compare the expected utility of allowing x=$\epsilon$ versus some tiny amount of protest greater than $\epsilon$ (which I'll call alpha for the demonstration).

```
In[•]:= Reduce[-(ϵ - 0)^2 > -((ϵ + α) - 0)^2 && ϵ > 0 && α > 0]
Out[•]=
ϵ > 0 && α > 0
```

However, the regime could be made better off by setting a punishment rule below $\rho$=$\epsilon$:

```
In[•]:= Reduce[-(ϵ - 0)^2 < -((ϵ - α) - 0)^2 && ϵ > 0 && α > 0]
Out[•]=
ϵ > 0 && 0 < α < 2 ϵ
```

Assume that the regime is choosing between pure strategies based on the possible outcomes of the random shock: max restriction is to punish any x>0 and min restriction (lenient rule) is to punish any x>$\epsilon$.

## Utility functions for punishment rules under expected bureaucrat strategies

If A chooses $\rho = 0$, this incentivizes the one bureaucrat who would purposefully approve protests, $\boldsymbol{B_{CD}}$, to deviate from their strategy of $\boldsymbol{(a^*_{CD} \mid \omega = 0) = \epsilon}$, since that would lead to being punished, and instead set $\boldsymbol{(a^*_{CD} \mid \omega = 0) = 0}$.

However, the autocrat, in choosing the restrictive threshold of $\rho$=0, will punish even loyal bureaucrats--if they're unlucky--in order to push those who would defy it to stay in line and deny all permits. So when will they want to do that?

If the autocratic regime sets a **restrictive** punishment rule of $\rho$=0, its **expected utility** is based on the probability of the shock yielding positive protest and the type of bureaucrat it faces, neither of which it knows when setting the rule.

ASSUME $k < \epsilon^2 - \epsilon^2\,\theta$, so incompetent disloyal defects/allows protest a=$\epsilon$-$\epsilon^*\theta$ and competent disloyal does the same (because k is necessarily less than $\epsilon^2$) under the restrictive rule.

```
In[•]:= Simplify[γ * (θ * (-(ϵ - 0)^2) + (1 - θ) * 0) +
   (1 - γ) * (θ * (ϕ * (-ϵ^2 - c) + (1 - ϕ) * (-((2 ϵ - ϵ * θ) - 0)^2 - c)) +
      (1 - θ) * (ϕ * (-((ϵ - ϵ * θ) - 0)^2 - c) + (1 - ϕ) * (-((ϵ - ϵ * θ) - 0)^2 - c)))]
Out[•]=
c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ))
```

ASSUME k $\geq \epsilon^2$ (and therefore $> \epsilon^2 - \epsilon^2 \theta$ as well),
so incompetent and competent disloyal
bureaucrats repress under restrictive rule.

```
In[•]:= Simplify[γ * (θ * (-(ϵ - 0)^2) + (1 - θ) * 0)
   + (1 - γ) * (θ * (ϕ * (-(ϵ - 0)^2 - c) + (1 - ϕ) * (-(ϵ - 0)^2 - c))
      + (1 - θ) * (ϕ * (-(0 - 0)^2) + (1 - ϕ) * (-((0) - 0)^2)))]
Out[•]=
(c (-1 + γ) - ϵ^2) θ
```

If the autocratic regime sets a **lenient** punishment rule of $\rho$=$\epsilon$, its **expected utility** is based on the probability of the shock yielding positive protest and the type of bureaucrat it faces.

ASSUME $k < \frac{\epsilon^2 - 2\epsilon^2\theta + \epsilon^2\theta^2}{\theta}$, so an incompetent disloyal bureaucrat defects a=$\epsilon$-$\epsilon^*\theta$ under lenient rule. This means that if the bureaucrat is unlucky and $\omega$=$\epsilon$, the protest outcome is x=$\epsilon$+$\epsilon$-$\epsilon\theta$ =2$\epsilon$-$\epsilon\theta$, and that bureaucrat is punished. Competent disloyal always defects a=$\epsilon$ if $\omega$=0 under lenient rule and represses a=0 if $\omega$=$\epsilon$. No punishment occurs under this rule, because protest never exceeds $\epsilon$.

```
In[•]:= FullSimplify[γ * (θ * (-(ϵ - 0)^2) + (1 - θ) * 0) +
   (1 - γ) * (θ * (ϕ * (-ϵ^2) + (1 - ϕ) * (-((2 ϵ - ϵ * θ) - 0)^2 - c)) +
      (1 - θ) * (ϕ * (-((ϵ) - 0)^2 - c) + (1 - ϕ) * (-((ϵ - ϵ * θ) - 0)^2)))]
Out[•]=
-γ ϵ^2 θ + (-1 + γ) (ϵ^2 (1 + (-1 + θ) θ (-1 + ϕ)) + c (θ + ϕ - 2 θ ϕ))
```

ASSUME $k \geq \frac{\epsilon^2 - 2\epsilon^2\theta + \epsilon^2\theta^2}{\theta}$, so incompetent disloyal sets a=0 under lenient rule. Competent disloyal always defects if $\omega$=0 and represses if $\omega$=$\epsilon$ under lenient rule.

```
In[•]:= FullSimplify[γ * (θ * (-(ϵ - 0)^2) + (1 - θ) * 0) +
   (1 - γ) * (θ * (ϕ * (-ϵ^2) + (1 - ϕ) * (-((0) - 0)^2)) +
      (1 - θ) * (ϕ * (-((ϵ) - 0)^2) + (1 - ϕ) * (-((0) - 0)^2)))]
Out[•]=
-ϵ^2 (γ (θ - ϕ) + ϕ)
```

## Equilibrium punishment rules

**Scenario 1:** $k < \epsilon^2 - \epsilon^2\theta$ **and** $k < \frac{\epsilon^2 - 2\epsilon^2\theta + \epsilon^2\theta^2}{\theta}$**, the autocratic regime prefers to choose the more restrictive rule ($\rho$=0) when the utility of the restrictive rule is greater than the lenient rule:**

```
In[•]:= Reduce[c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)) >
          -γ ϵ^2 θ + (-1 + γ) (ϵ^2 (1 + (-1 + θ) θ (-1 + ϕ)) + c (θ + ϕ - 2 θ ϕ)) &&
        0 < ϵ && c > 0 && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1, Reals]
```

Out[•]=

$$0 < \phi < 1 \;\&\&\; 0 < \theta < 1 \;\&\&\; 0 < \gamma < 1 \;\&\&\; \epsilon > 0 \;\&\&\; 0 < c < \frac{2\,\epsilon^2\,\theta\,\phi - 3\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi}{1 - \theta - \phi + 2\,\theta\,\phi}$$

The regime will prefer the more restrictive rule over the lenient rule when the incompetent, disloyal type is more likely to REPRESS by setting a=0 as long as the cost the regime incurs for punishment is sufficiently low: $0 < c < \frac{2\,\epsilon^2\,\theta\,\phi - 3\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi}{1-\theta-\phi+2\,\theta\,\phi}$

**Scenario 2: If $k \geq \epsilon^2 - \epsilon^2\,\theta$ and $k < \frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta}$, the autocratic regime prefers to choose the more restrictive rule ($\rho$=0) when the utility of the restrictive rule is greater than the lenient rule:**

```
In[•]:= Reduce[-ϵ^2 (γ (θ - ϕ) + ϕ) > -γ ϵ^2 θ + (-1 + γ) (ϵ^2 (1 + (-1 + θ) θ (-1 + ϕ)) + c (θ + ϕ - 2 θ ϕ)) &&
        0 < ϵ && c > 0 && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1, Reals]
```

Out[•]=

$$0 < \phi < 1 \;\&\&\; 0 < \theta < 1 \;\&\&\; 0 < \gamma < 1 \;\&\&\; \epsilon > 0 \;\&\&\; c > 0$$

The regime will always prefer the more restrictive rule over the lenient rule when the incompetent, disloyal type will tow the line under the restrictive rule but defect by allowing protest under the lenient rule.

**Scenario 3: If $k \geq \epsilon^2 - \epsilon^2\,\theta$** (restrictive rule) **and $k \geq \frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta}$ (lenient rule), the autocratic regime prefers to choose the more restrictive rule ($\rho$=0) when the utility of the restrictive rule is greater than the lenient rule:**

```
In[•]:= Reduce[(c (-1 + γ) - ϵ^2) θ > -ϵ^2 (γ (θ - ϕ) + ϕ) &&
        0 < ϵ && c > 0 && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1, Reals]
```

Out[•]=

$$0 < \phi < 1 \;\&\&\; 0 < \theta < \phi \;\&\&\; \epsilon > 0 \;\&\&\; 0 < c < \frac{-\epsilon^2\,\theta + \epsilon^2\,\phi}{\theta} \;\&\&\; 0 < \gamma < 1$$

The regime will prefer the more restrictive rule over the lenient rule when the incompetent, disloyal type is more likely to REPRESS by setting a=0 as long as the cost the regime incurs for punishment is sufficiently low: $0 < c < \frac{-\epsilon^2\,\theta + \epsilon^2\,\phi}{\theta}$

**Scenario 4: $k < \epsilon^2 - \epsilon^2\,\theta$ and $k > \frac{\epsilon^2 - 2\,\epsilon^2\,\theta + \epsilon^2\,\theta^2}{\theta}$, the autocratic regime prefers to choose the more restrictive rule ($\rho$=0) when the utility of the restrictive rule is greater than the lenient rule:**

In[•]:=
```
Reduce[c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)) >
    -ϵ^2 (γ (θ - ϕ) + ϕ) && 0 < ϵ && c > 0 && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1, Reals]
```

Out[•]=

$$0 < \theta < 1 \;\&\&\; \frac{1 + \theta - \theta^2}{1 + 3\,\theta - 4\,\theta^2 + \theta^3} < \phi < 1 \;\&\&\; 0 < \gamma < 1 \;\&\&\; \epsilon > 0 \;\&\&\; 0 < c < -\epsilon^2 - \epsilon^2\,\theta + \epsilon^2\,\theta^2 + \epsilon^2\,\phi + 3\,\epsilon^2\,\theta\,\phi - 4\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi$$

**Is it possible for scenario 4 to exist? NO.**

In[•]:=
```
Reduce[ϵ^2 - ϵ^2 θ > (ϵ^2 - 2 ϵ^2 θ + ϵ^2 θ^2)/θ && 0 < ϵ && c > 0 && 0 < γ < 1 && 0 < θ < 1 && 0 < ϕ < 1, Reals]
```

Out[•]=
```
False
```

## Comparative Statics

**Implication A1:** The autocratic regime is **less** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the bureaucrat's cost of being punished (k) increases.

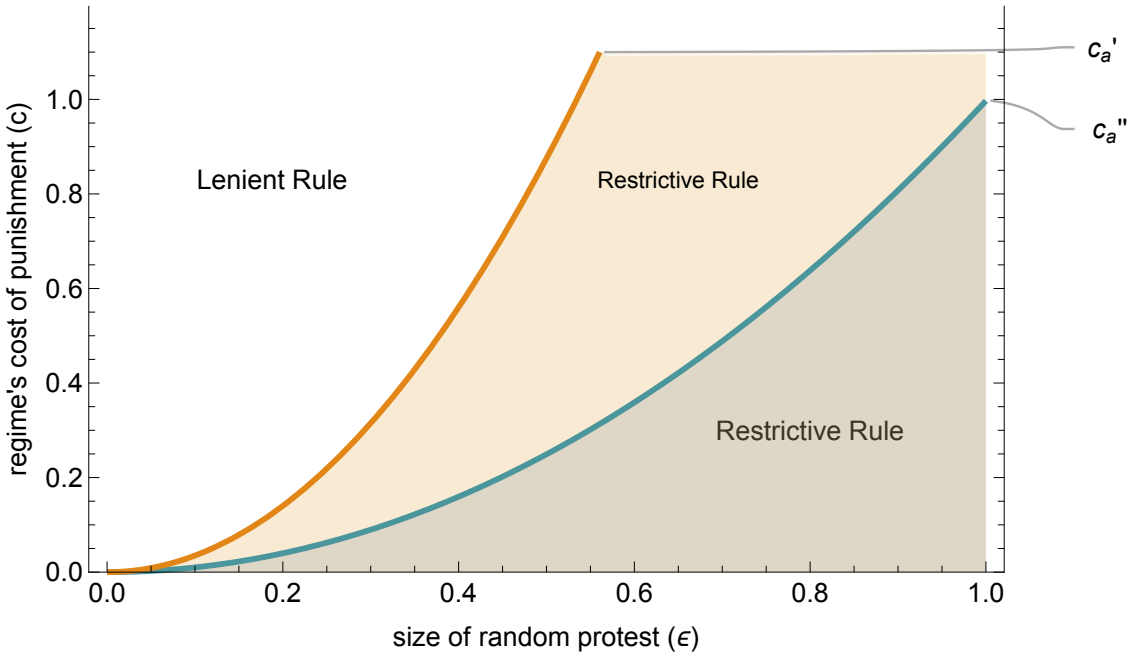
In[•]:=
```
ϕ = .9;
θ = .2

0.8
```

Out[•]=
```
0.2
```

In[•]:=
```
Unset[ϕ]
Unset[θ]
```

In[ ]:=
```
Plot[{Callout[(2 ϵ^2 θ ϕ - 3 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ)/(1 - θ - ϕ + 2 θ ϕ), "Lenient Rule", {.2, .8}, Appearance → None],
  (-ϵ^2 θ + ϵ^2 ϕ)/θ}, {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "ThickLines",
 PlotLabels → {"c_a'''", "c_a'"}, PlotRange → {0, 1.1}, Frame → {True, True, False, True},
 LabelStyle → {14, GrayLevel[0]}, FrameLabel → {"size of random protest (ϵ)",
   "regime's cost of punishment (c)", "", ""}, Filling → Bottom,
 Prolog → Inset[Text[Style["Restrictive Rule", FontSize → 14]], {.8, .3}],
 Epilog → Inset[Text[Style["Restrictive Rule", FontSize → 12]], {.65, .83}]]
```

Out[ ]=



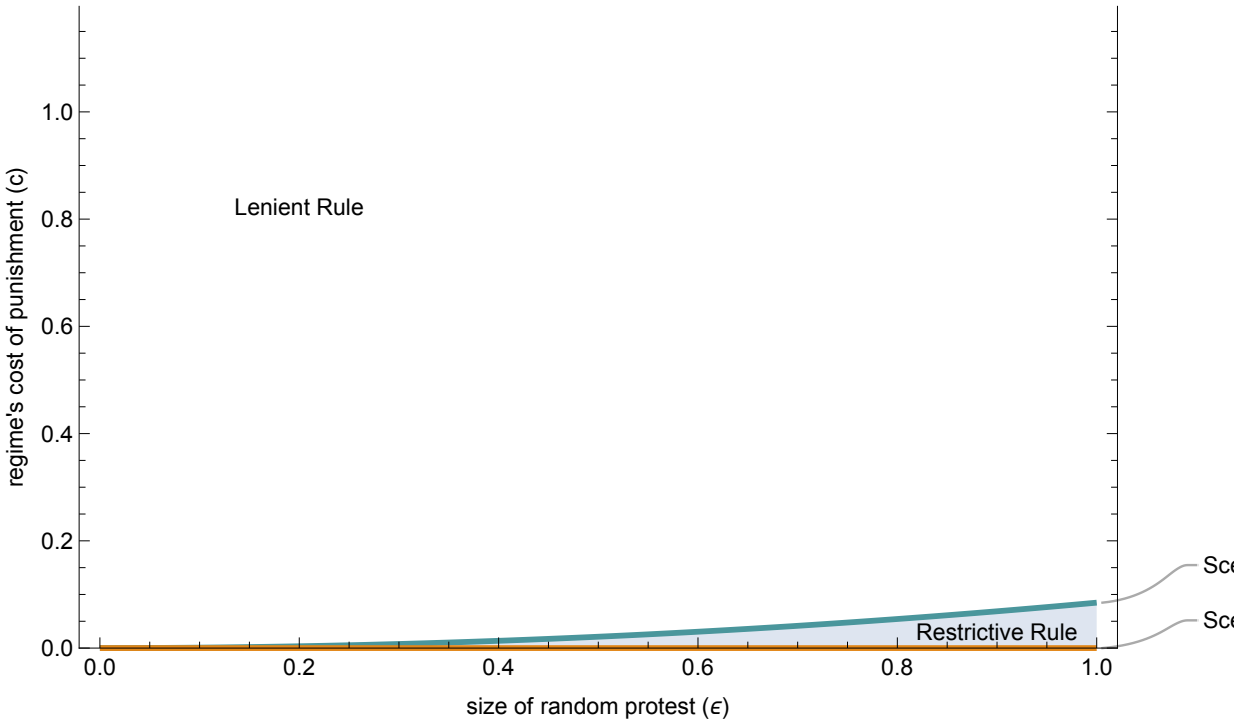

In[ ]:=
```
ϕ = .2;
θ = .2
```

Out[ ]=
```
0.2
```

```
Unset[ϕ]
Unset[θ]
```

In[ ]:=
```
Plot[{Callout[(2 ϵ^2 θ ϕ - 3 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ)/(1 - θ - ϕ + 2 θ ϕ), "Lenient Rule", {.2, .8}, Appearance → None],
  (-ϵ^2 θ + ϵ^2 ϕ)/θ}, {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "ThickLines",
 PlotLabels → {"Scenario 2", "Scenario 1"}, PlotRange → {0, 1.1},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]},
 FrameLabel → {"size of random protest (ϵ)",
   "regime's cost of punishment (c)", "", ""}, Filling → Bottom,
 Epilog → Inset[Text[Style["Restrictive Rule", FontSize → 12]], {.9, .03}]]
```

Out[ ]=



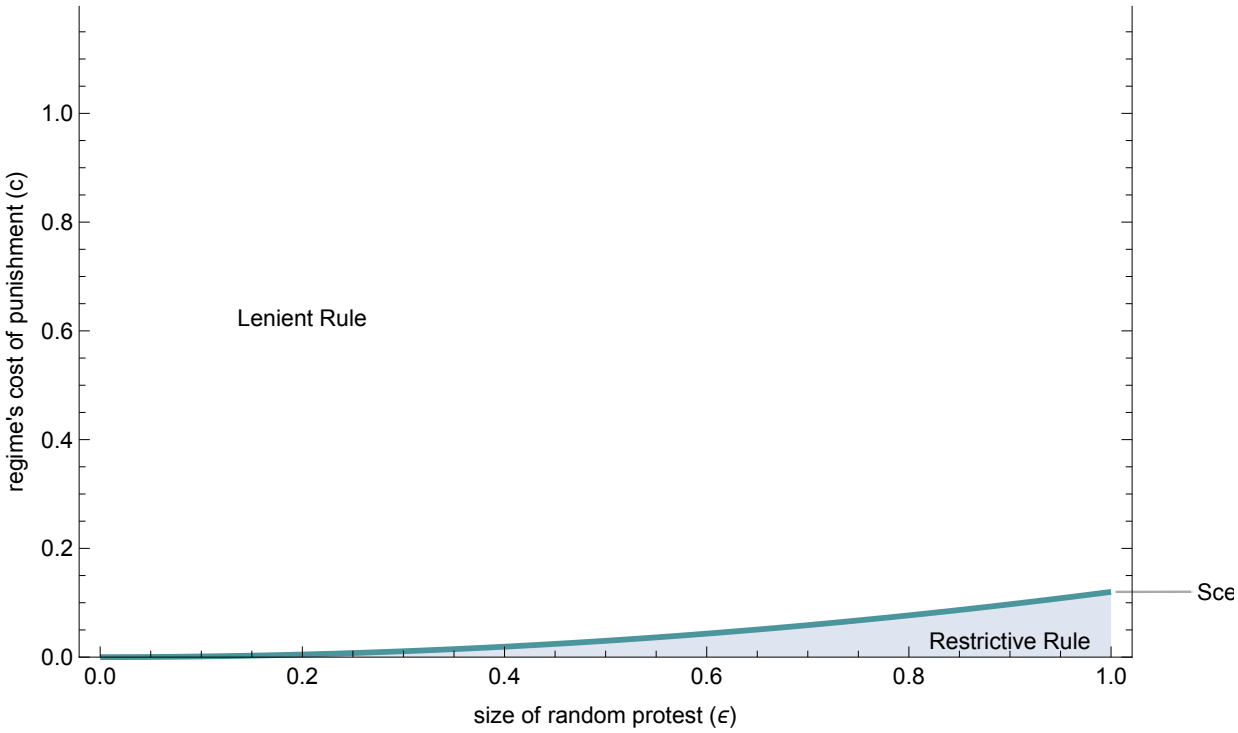

In[ ]:=
```
ϕ = .2;
θ = .8
```

Out[ ]=
```
0.8
```

```
Unset[ϕ]
Unset[θ]
```

In[ ]:=
```
Plot[{Callout[(2 ϵ^2 θ ϕ - 3 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ)/(1 - θ - ϕ + 2 θ ϕ), "Lenient Rule", {.2, .6}, Appearance → None],
  (-ϵ^2 θ + ϵ^2 ϕ)/θ}, {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "ThickLines",
 PlotLabels → {"Scenario 2", "Scenario 2"}, PlotRange → {0, 1.1},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]},
 FrameLabel → {"size of random protest (ϵ)",
   "regime's cost of punishment (c)", "", ""}, Filling → Bottom,
 Epilog → Inset[Text[Style["Restrictive Rule", FontSize → 12]], {.9, .03}]]
```

Out[ ]=

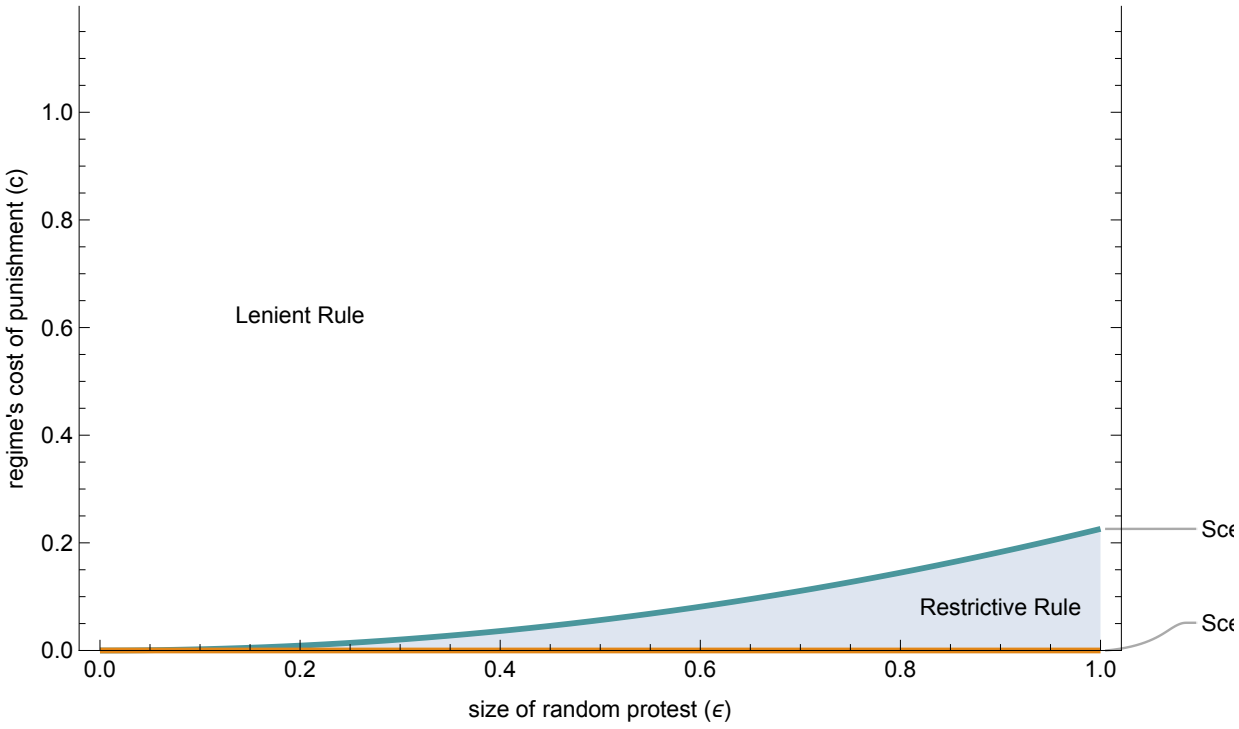



In[ ]:=
```
ϕ = .8;
θ = .8
```

Out[ ]=
```
0.8
```

```
In[ ]:= Plot[{Callout[(2 ϵ^2 θ ϕ - 3 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ)/(1 - θ - ϕ + 2 θ ϕ), "Lenient Rule", {.2, .6}, Appearance → None],
    (-ϵ^2 θ + ϵ^2 ϕ)/θ}, {ϵ, 0, 1}, PlotStyle → 98, PlotTheme → "ThickLines",
  PlotLabels → {"Scenario 2", "Scenario 1"}, PlotRange → {0, 1.1},
  Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]},
  FrameLabel → {"size of random protest (ϵ)",
    "regime's cost of punishment (c)", "", ""}, Filling → Bottom,
  Epilog → Inset[Text[Style["Restrictive Rule", FontSize → 12]], {.9, .08}]]
```

Out[ ]=




```
In[ ]:= Unset[ϕ]
        Unset[θ]
```

The key cutpoint where the autocratic regime chooses a lenient rule versus a restrictive rule is:

$$c > \frac{2\,\epsilon^2\,\theta\,\phi - 3\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi}{1 - \theta - \phi + 2\,\theta\,\phi}$$

This isn't the only one, of course, but it tracks with the monotonically increasing other cutpoints. Define the right side of this inequality as the cutpoint $c^*$, so we can take comparative statics:

```
In[ ]:= c* := (2 ϵ^2 θ ϕ - 3 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ)/(1 - θ - ϕ + 2 θ ϕ)
```

## Implication A2: The autocrat is **more** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the size of the undeterrable (shock) protest ($\epsilon$) increases.

To see this, take the derivative of $c^*$ wrt $\epsilon$:

```
In[ ]:= D[c*, ϵ]
```

Out[ ]=

$$\frac{4\,\epsilon\,\theta\,\phi - 6\,\epsilon\,\theta^2\,\phi + 2\,\epsilon\,\theta^3\,\phi}{1 - \theta - \phi + 2\,\theta\,\phi}$$

Which is strictly increasing:

```
In[ ]:= Reduce[% > 0 && 0 < θ < 1 && 0 < ϕ < 1 && ϵ > 0]
```

Out[ ]=

$$0 < \phi < 1 \;\&\&\; 0 < \theta < 1 \;\&\&\; \epsilon > 0$$

Since the cutpoint BELOW which the regime prefers the restrictive rule increases in $\epsilon$, the restrictive rule is more likely as $\epsilon$ increases. (This is compatible with B6, where the disloyal bureaucrats repress less as $\epsilon$ increases, in that a regime would want to restrict in precisely that condition.)

## Implication A3: The autocrat is **less** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the autocrat's cost for punishment (c) increases.

This is true under equilibrium: the regime prefers the lenient rule when c is greater than $c^*$.

## Implication A4: The autocrat is **less** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the probability of the ungovernable (shock) protest ($\theta$) increases.

To see this, take the derivative of $c^*$wrt $\theta$:

```
In[ ]:= D[c*, θ]
```

Out[ ]=

$$\frac{2\,\epsilon^2\,\phi - 6\,\epsilon^2\,\theta\,\phi + 3\,\epsilon^2\,\theta^2\,\phi}{1 - \theta - \phi + 2\,\theta\,\phi} - \frac{(-1 + 2\,\phi)\,\left(2\,\epsilon^2\,\theta\,\phi - 3\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi\right)}{(1 - \theta - \phi + 2\,\theta\,\phi)^2}$$

which is decreasing when the probability that the bureaucrat is competent is low:

```
In[ ]:= Reduce[% < 0 && ϵ > 0 && 1 > ϕ > 0 && 1 > θ > 0]
```

Out[ ]=

$$0 < \theta < 1 \;\&\&\; \frac{-2 + 6\,\theta - 6\,\theta^2 + 2\,\theta^3}{-2 + 6\,\theta - 9\,\theta^2 + 4\,\theta^3} < \phi < 1 \;\&\&\; \epsilon > 0$$

Since the cutpoint BELOW which the regime prefers the restrictive rule decreases in $\theta$, the restrictive rule is less likely as $\theta$ increases. (This is compatible with B5, where the disloyal bureaucrats repress

more as $\theta$ increases, in that a regime would want to be lenient in precisely that condition.) But when the bureaucrat is likely to be competent, the cutpoint increases, making the restrictive rule more likely in eqm.

## Implication A5: The autocrat is **more** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the probability of the ungovernable (shock) protest ($\theta$) increases.

To see this, take the derivative of $c^*$wrt $\theta$:

```
In[•]:= D[c*, ϕ]
```

Out[•]=

$$\frac{2\,\epsilon^2\,\theta - 3\,\epsilon^2\,\theta^2 + \epsilon^2\,\theta^3}{1 - \theta - \phi + 2\,\theta\,\phi} - \frac{(-1 + 2\,\theta)\,\left(2\,\epsilon^2\,\theta\,\phi - 3\,\epsilon^2\,\theta^2\,\phi + \epsilon^2\,\theta^3\,\phi\right)}{(1 - \theta - \phi + 2\,\theta\,\phi)^2}$$

which is strictly increasing:

```
In[•]:= Reduce[% > 0 && ϵ > 0 && 1 > ϕ > 0 && 1 > θ > 0]
```

Out[•]=

```
0 < ϕ < 1 && 0 < θ < 1 && ϵ > 0
```

Since the cutpoint BELOW which the regime prefers the restrictive rule increases in $\phi$, the restrictive rule is more likely as $\phi$ increases. (This is compatible with B4, where the disloyal bureaucrats repress more when they're competent, in that a regime would want to restrict in precisely that condition.)

## Implication A6: The autocrat is **less** likely to choose the restrictive rule and punish bureaucrats for uncontrolled protest as the probability that the bureaucrat is loyal ($\gamma$) increases.

Take the derivative of the first utility function to investigate the role of loyalty in the regime's decision:

```
In[•]:= D[c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)), γ]
```

Out[•]=

```
c - ϵ^2 (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)
```

Which is strictly increasing as long as c is sufficiently high for the regime to prefer the restrictive rule:

```
In[•]:= Reduce[% > 0 && 0 < θ < 1 && 0 < ϕ < 1 && ϵ > 0]
```

Out[•]=

```
0 < ϕ < 1 && 0 < θ < 1 && ϵ > 0 && c > -ϵ^2 + ϵ^2 θ^2 + 3 ϵ^2 θ ϕ - 4 ϵ^2 θ^2 ϕ + ϵ^2 θ^3 ϕ
```

Plot the expected utilities as a function of $\gamma$ to investigate the role of loyalty in the regime's decision:

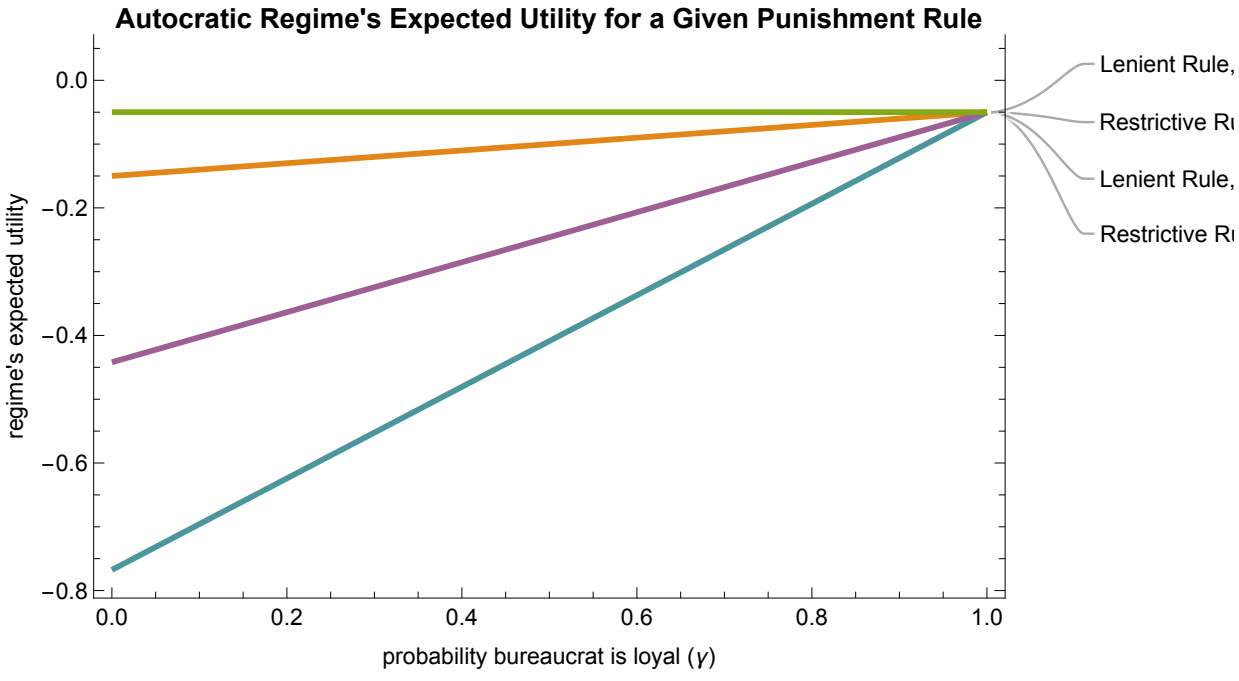
In[ ]:=
```
ϕ = .2;
θ = .2;
ϵ = .5;
c = .5
```

Out[ ]=
```
0.5
```

```
Unset[ϕ]
Unset[θ]
Unset[ϵ]
Unset[c]
```

In[ ]:=
```
Plot[{c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)),
  (c (-1 + γ) - ϵ^2) θ, -γ ϵ^2 θ + (-1 + γ) (ϵ^2 (1 + (-1 + θ) θ (-1 + ϕ)) + c (θ + ϕ - 2 θ ϕ)),
  -ϵ^2 (γ (θ - ϕ) + ϕ)}, {γ, 0, 1}, PlotStyle → 98,
 PlotTheme → "ThickLines", PlotLabel → Style[
   "Autocratic Regime's Expected Utility for a Given Punishment Rule", Bold],
 PlotLabels → {"Restrictive Rule, low k", "Restrictive Rule, high k",
   "Lenient Rule, low k", "Lenient Rule, high k"},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]}, FrameLabel →
  {"probability bureaucrat is loyal (γ)", "regime's expected utility", "", ""}]
```

Out[ ]=



In[ ]:=
```
Plot[{c (-1 + γ) + ϵ^2 (-1 - θ + θ^2 + 3 θ ϕ - 4 θ^2 ϕ + θ^3 ϕ - γ (-1 + θ) (1 + θ - 3 θ ϕ + θ^2 ϕ)),
  (c (-1 + γ) - ϵ^2) θ, -γ ϵ^2 θ + (-1 + γ) (ϵ^2 (1 + (-1 + θ) θ (-1 + ϕ)) + c (θ + ϕ - 2 θ ϕ)),
  -ϵ^2 (γ (θ - ϕ) + ϕ)}, {γ, 0, 0.8}, PlotStyle → 98,
 PlotTheme → "ThickLines", PlotLabel → Style[
   "Autocratic Regime's Expected Utility for a Given Punishment Rule", Bold],
 PlotLabels → {"Restrictive Rule, low k", "Restrictive Rule, high k",
   "Lenient Rule, low k", "Lenient Rule, high k"},
 Frame → {True, True, False, True}, LabelStyle → {12, GrayLevel[0]}, FrameLabel →
  {"probability bureaucrat is loyal (γ)", "regime's expected utility", "", ""}]
```

Out[ ]=