# Dual-Layered Coordination and Political Instability: Repression, Co-optation, and the Role of Information

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We study coordination dynamics in the context of two groups under the shadow of political instability. One group (regime opponents) prefers a change in regime and can participate in an attack, which if sufficiently large, causes regime change. The other group (regime adherents) prefers the status quo and can support the regime, making it more resistant to attack. We derive and analyze the endogenously determined strength of the regime and isolate the strategic feedback between opponent coordination and adherent coordination. Because of this interrelated coordination dynamic we find that repression and co-optation are substitutes. In addition, we show that coordination frictions between regime adherents intensify the already disproportionate impact of public information. Moreover, public information affects individual actions in each group identically, regardless of disparities in the quality of private information available to members of each group. This implies that it is the least well-informed that determine the influence of public information.

Political instability is an endogenous process that ultimately depends on the interaction between individuals who oppose the regime and individuals with a vested interest in maintaining the status quo. This observation suggests that political instability is fundamentally about the conflict between at least two different political groups. Importantly, when groups come into conflict, there are two distinct social dynamics that interact—conflict and collective action.[1] In general, the interaction of these dynamics raises the question of how relative advantages in the ability of a group to coordinate its members actually translates into group success in conflict and, also, to what extent group success is self-fulfilling. In this article we analyze the coordination dynamic between two imperfectly coordinated groups and address the key differences distinguishing a conflict among two individuals and a conflict between two groups.

In settings where two groups come into conflict, casual intuition suggests that the outcome is dictated by the group that more effectively coordinates—meaning that the group's members better align their actions. Put another way, a failure within a group to effectively coordinate its members can be a critical strategic disadvantage. An important takeaway of this article is to show that this intuition is incomplete, and somewhat misleading, as it implicitly overlooks a critical fact: the coordination dynamic within one group is strategically linked to the coordination dynamic of the other group. In particular, how well one group coordinates creates a strategic spillover that affects how the other group coordinates. For instance, during the Arab Spring, the high level of organization exhibited by religiously motivated opposition groups helped coordinate support among secular groups and, arguably, among different regime members. Although the litera-

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1. Aside from conflict between an insurgency and a government, other examples of conflict between groups include conflict between coalitions, conflict between political lobbies, political party competition, and competition between teams (see, e.g., Polborn 2006).

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ture on regime change and political instability has typically treated the logic of regime adherents (elite driven) and regime opponents (mass driven) separately, the strategic link we highlight suggests that this conceptual division is problematic.

To analyze the "dual-layered" coordination dynamic underlying regime change, we develop a model (building on the global-game approach) where one group's members desire regime change, regime opponents, and can actively try to bring down the regime, while the other group's members, regime adherents, enjoy the status quo and can actively increase the ability of the regime to withstand an attack from opponents.[2] Because the interests of regime adherents and regime opponents are diametrically opposed, there is a fundamental conflict between groups. Additionally, no single individual (in either group) can unilaterally determine the ultimate outcome, and as a result, individuals within each group need to work together, thus creating a complementarity between group members. Because in both coordination and conflict settings the actions of others are a key ingredient of an individual's strategic calculus, strategic uncertainty, meaning uncertainty regarding the actions of other individuals, plays an important role.

The regime change literature stresses the importance of coordination among regime opponents (e.g., Bueno de Mesquita 2010; Shadmehr and Bernhardt 2011; Tilly 1978), but we show that the coordination dynamic underlying regime change features two distinct layers. The first layer is within-group coordination, which is the alignment of individual actions within a specific group, arising from complementarities between individuals who are members of the same group. The within-group dilemma arises because, despite being members of the same group, an individual is not necessarily sure how members of her own group will act. The second layer is between-group coordination, which is the alignment of aggregate actions between groups that constitutes the de facto incentive to coordinate between groups. The between-group coordination dilemma arises from the uncertainty between groups because members of one group do not know with certainty how well mobilized the other group is. Our model isolates the strategic feedback between regime adherents and regime opponents that arises because each group's internal coordination problem affects the incentive to coordinate within the other group. Specifically, the act of rebellion for an opponent and the act of supporting the regime for a regime adherent are strategic substitutes.

Our model stresses the importance of internal coordination dynamics between regime adherents and the strategic feedback that exists between coordinated rebellion and coordinated regime support. We analyze the equilibria of our dual-layered model and derive the necessary and sufficient conditions for equilibrium uniqueness. In addition to the standard influence of public information on the set of equilibria, a novel implication of our model, resulting from between-group coordination, is that size disparities between groups can also lead to multiple equilibria. When there is a large enough disparity between the importance of groups (e.g., size disparities, power disparities, etc.), a single group, by aligning their actions within the group, can create a strong incentive for alignment within the other group. For instance, when regime adherents are a sufficiently important component of the regime's strength, then between-group coordination can swamp out coordination among regime opponents because coordination with adherents becomes their primary motivation, and this leads to multiple equilibria.

Using our model, we study how the dual-layered coordination dynamic underlying political instability influences three common tools that regimes use to keep power: repression, co-optation, and the control of information (Gehlbach, Sonin, and Svolik 2016). Our model shows that the interconnected coordination dynamic between regime opponents and regime adherents affects how different government tools such as repression or co-optation affect the set of regimes that can survive popular challenges. Because of the strategic link between opponents and adherents that we identify, repression and co-optation have similar effects on how individuals (both regime opponents and regime adherents) make decisions. In particular, increases in repression create an important spillover—they provide an indirect incentive for regime adherents to support the regime. Similarly, increases in co-optation provide an indirect incentive for regime opponents to abstain from challenging the government. The total impact of each follows by considering how strategic spillovers from between-group coordination affect the interaction of opponents and adherents.

As in other models that exhibit strategic uncertainty in a coordination environment, public information plays a disproportionate and important role. We show that when considering conflict between groups, the comparative mobilization between groups intensifies the already disproportionate influence of public information. An attractive feature of our model is that it allows us to isolate the "behavioral multiplier" measuring the intensity of the strategic feedback between groups. Remarkably, between-group coordination implies that each group responds to public information identically,

2. It is important to note that this kind of threshold setup is applicable to a wide variety of political contexts, such as regime change (Bueno de Mesquita 2014) or elections (Myatt 2007).

regardless of disparities in the quality of private information between members of each group. In particular, although the informativeness of public information is greater for individuals in the group with less accurate private information (most likely regime opponents), the strategic response of individuals in the better-informed group is greater. Consequently, the straightforward intuition that individuals with good private information are less likely to be swayed by bad public information fails when those individuals want to coordinate with poorly informed individuals. A regime cannot assure adherent support by simply informing adherents that fundamentals are strong without also giving similar information to regime opponents.

Finally, our model allows us to analyze the severity of the coordination problem by formally measuring a coordination failure. We isolate two distinct kinds of coordination failures related to the layers of strategic uncertainty we highlight. First, corresponding to within-group coordination, a group-specific coordination failure constitutes a case where one group could have done better had individuals within the group better aligned their actions. Second, when total welfare can be improved by better coordinating the actions across groups, there is a between-group coordination failure. These concepts provide a useful benchmark for considering how frictions inhibiting the coordinating capacity of groups are distinct and more nuanced than what arises in standard models.

## RELATED LITERATURE

It is difficult to overstate the importance of coordination dynamics in political environments, but capturing a coordination dynamic formally has proven to be a challenge, most notably because coordination incentives typically lead to multiple equilibria. Embracing this feature, some scholars have focused on issues of equilibrium selection, or focal points that serve to align expectations on specific patterns of behavior (Chwe 2001; Myerson 2004). In the presence of multiple equilibria, factors like issue salience (Dragu and Polborn 2013), institutional features (Weingast 1997), or ethnic identities (Hardin 1995) can create a system of norms or beliefs that help align individual behavior. In such contexts, perfect coordination is a feature of equilibrium, and so the equilibrium selection approach does not generally apply to contexts where common knowledge is not substantively plausible. In substantive settings where individuals are unsure of the actions of others, it may be difficult for individuals to coordinate their behavior effectively enough to support multiple equilibria. In other words, individuals may face a scenario in which they may fail to coordinate because they face strategic uncertainty. Bueno de Mesquita (2016, chap. 5) distinguishes a coordination trap, which relies on equilibrium selection, and a coordination failure, which relies on strategic uncertainty.

We argue that strategic uncertainty is a fundamental feature of political instability, and to capture this important feature formally we exploit the global game approach originally developed by Carlsson and van Damme (1993). Such an approach has been applied to political contexts such as riots (Atkeson 2001), regime change (Angeletos, Hellwig, and Pavan 2007; Bueno de Mesquita 2014), strategic voting (Myatt 2007), party leadership (Dewan and Myatt 2007), and political propaganda (Edmond 2013).

Using similar techniques, Shadmehr and Bernhardt (2011) examine a two-player regime change game to study how public information influences successful revolt and leads to novel interactions between repression and rebellion, which they term punishment dilemmas. Casper and Tyson (2014) examine a model where a set of protesters and a set of coup plotters each face distinct coordination problems but the collective action of protesters provides information to coup plotters since the thresholds determining success for each group are correlated. The strategic connection considered by Casper and Tyson (2014) is purely informational, whereas we examine groups concerned with a common outcome who do not observe each others' actions.

Political instability critically depends on the interrelatedness of the coordination dynamic that underlies both the opposition as well as the government (Karklins and Peterson 1993). By formally identifying the strategic link in this dynamic, we examine how three common tools that governments use to retain control affect this relationship: repression, co-optation, and censorship (Gehlbach et al. 2016). First, the majority of the repression literature is concerned with the "dissent-repression nexus" (Davenport 2007; Finkel, Gehlbach, and Olsen 2015; Ritter 2014; Ritter and Conrad 2015), and coordination issues are typically treated as a mitigating factor but are not explicitly considered and formally analyzed. Second, co-optation is a government's strategy to ensure support from political elites. Gandhi and Przeworski (2006, 2007) and Svolik (2012) argue that co-optation helps a regime withstand popular rebellion, but they do not consider the strategic link between regime opponents and regime adherents. Last, a growing literature suggests that there is a complex relationship between information and collective action in autocratic regimes. New studies show that autocrats use media and information as a tool to retain power (Gehlbach and Sonin 2014) and that transparency is associated with the likelihood that governments fail (Hollyer, Rosendorff, and Vreeland 2011, 2015). Additionally, autocrats often use media sources to monitor

and discipline bureaucrats (Chen and Xu 2016; Egorov, Guriev, and Sonin 2009; Gehlbach and Simpser 2015; Lorentzen 2014). Our model, and its results, complement this literature by detailing how different government tools affect the dual-layered coordination dynamic that underlies political instability.

## THE MODEL

Consider the strategic interaction between two large groups of actors. First are regime opponents, who are unhappy with the current regime and prefer regime change. There is a unit measure of regime opponents, each of whom can choose either to rebel ($s_r^i = 1$) or abstain ($s_r^i = 0$). In addition to regime opponents, there is a measure, $\lambda \geq 0$, of regime adherents, who benefit from the current regime relative to the alternative, and therefore prefer the status quo. Each regime adherent can choose whether to support the regime ($s_a^j = 1$) or desert it ($s_a^j = 0$). The parameter $\lambda$ represents differences, including size or strength, in the physical importance of regime adherents relative to regime opponents. The payoffs of a member of group $t$ are as follows, where actions are represented by rows and outcomes are represented by columns:

| Payoff | Status Quo (SQ) | Regime Change (RC) |
|---|---|---|
| $s_t = 1$ | $u_t(1; \text{SQ})$ | $u_t(1; \text{RC})$ |
| $s_t = 0$ | $u_t(0; \text{SQ})$ | $u_t(0; \text{RC})$ |

The coordination incentive is captured by assuming that $u_r(0; \text{SQ}) > u_r(1; \text{SQ})$ and $u_r(1; \text{RC}) > u_r(0; \text{RC})$ for regime opponents and $u_a(0; \text{SQ}) < u_a(1; \text{SQ})$ and $u_a(1; \text{RC}) < u_a(0; \text{RC})$ for regime adherents. Moreover, regime opponents prefer regime change, $u_r(1; \text{RC}) > u_r(0; \text{SQ})$, and regime adherents prefer the status quo, $u_a(0; \text{SQ}) > u_a(1; \text{RC})$.

Without loss of generality, by defining

$$C_r = \frac{u_r(0; \text{SQ}) - u_r(1; \text{SQ})}{u_r(0; \text{SQ}) - u_r(1; \text{SQ}) + u_r(1; \text{RC}) - u_r(0; \text{RC})}$$

and

$$C_a = \frac{u_a(0; \text{RC}) - u_a(1; \text{RC})}{u_a(1; \text{SQ}) - u_a(0; \text{SQ}) + u_a(0; \text{RC}) - u_a(1; \text{RC})},$$

we can normalize the payoffs for each group to[3]

| Opponents | SQ | RC | Adherents | SQ | RC |
|---|---|---|---|---|---|
| Rebel | $-C_r$ | $1 - C_r$ | Support | $1 - C_a$ | $-C_a$ |
| Abstain | 0 | 0 | Desert | 0 | 0 |

Under this normalization, a regime opponent incurs a participation cost given by $C_r \in (0, 1)$, and receives a benefit normalized to 1 from participating in successful regime change. A regime opponent's payoff from abstention is normalized to 0. The payoff to being a loyal member of a regime that survives is normalized to 1 and the payoff from deserting a regime is normalized to 0. The logic is similar for regime adherents where $C_a \in (0, 1)$.

The strategic environment in our model is characterized by an underlying state of the world $\theta \in \mathbb{R}$, which we will refer to as the *regime fundamental*. The regime fundamental is composed of economic conditions or of the contribution of other groups who do not face collective action problems. The structural capacity of the regime is determined through the continuously differentiable function $w(\theta, \lambda)$, which is strictly increasing in $\theta$. Together the weighted sum of structural capacity and regime adherent support determines the proportion of regime opponents who must actively rebel in order to cause a change in the regime. Denote the proportion of opponents who rebel by $\mathcal{R}$, and the proportion of regime adherents who support the regime by $\mathcal{E}$. The regime survives if and only if

$$w(\theta, \lambda) + \lambda\mathcal{E} > \mathcal{R}. \quad (1)$$

If the combination of adherent support and structural regime capacity is greater than the proportion of regime opponents who rebel, then the regime survives; otherwise, the regime fails.[4]

As is standard in global game applications, we assume that there exist some states of the world in which the regime fails regardless of the actions of individuals and that there exist some states of the world where the regime survives regardless of the actions of individuals. Formally, this implies that for every $\lambda$, there exists a $\underline{\theta}_\lambda$ such that $w(\underline{\theta}_\lambda, \lambda) = -\lambda$, and a $\bar{\theta}_\lambda$ such that $w(\bar{\theta}_\lambda, \lambda) = 1$. Notice that if it were commonly known that $\theta < \underline{\theta}_\lambda$, then all individuals would have a dominant strategy to abandon the regime or rebel. Likewise, if it were commonly known that $\theta > \bar{\theta}_\lambda$, then all individuals would have a dominant strategy to support

3. See appendix, sec. B.

4. Additive separability between structural capacity, adherent mobilization, and opponent mobilization is adopted for convenience and is not essential for our results.

the regime. To illustrate our assumptions consider an example where $\lambda_a$ is the size of regime adherents, $\lambda_r$ is the size of regime opponents, and structural regime fundamentals are represented by $\theta$. This example maps to our framework by letting $\lambda = \lambda_a/\lambda_r$ and $w(\theta, \lambda) = (\lambda_r)^{-1} \cdot \theta = \lambda(\lambda_a)^{-1} \cdot \theta$.

Political instability is generally characterized by a large degree of uncertainty about the regime's future, and perhaps most importantly, by uncertainty about the actions and behavior of others. To capture strategic uncertainty between individuals in our model, we assume that the regime fundamental, $\theta$, is not commonly known and is drawn according to an improper uniform prior (where every real number is equally likely). Individuals form beliefs by considering common or shared sources of information (obtained from various media sources) as well as private sources of information based on idiosyncratic experiences and differences in cognitive abilities. Formally, all actors see a common public signal $Q = \theta + \tau^Q$, where $\tau^Q$ is independent of $\theta$, and normally distributed with mean 0 and variance $1/\alpha$ (as is common convention, we refer to $\alpha$ as the precision). In addition to the public signal, individual $i$ in group $t$ receives a private signal $Z_t^i = \theta + \varepsilon_t^i$ where $\varepsilon_t^i$ is independent of $\theta$, $Q$, and across individuals, and is normally distributed with mean 0 and precision $\beta_t$. Individual $i$ of group $t$, after observing her private signal $Z_t^i$ and the public signal $Q$, believes that $\theta$ is normally distributed with mean $z_t^i$ and precision $\alpha + \beta_t$, where $z_t^i = (1 - \eta_t)Q + \eta_t Z_t^i$, and $\eta_t = \beta_t/(\alpha + \beta_t)$ is the relative importance of an individual's private information in her posterior belief regarding the regime fundamental.[5] A critical feature of the information structure of this game is that information shapes not only an individual's belief about the value of the regime fundamental, but, more importantly, it shapes what individuals perceive about the actions of other individuals.

A strategy in this model is a measurable function that maps from an individual posterior expectation of $\theta$ to the binary action set of an individual. We consider symmetric Bayesian Nash equilibria in strategies that are monotonic in posterior expectations. We focus on these monotone strategies, and in the appendix (available online) we establish that this focus is without loss of generality. Suppose that each regime opponent chooses to rebel if and only if his posterior expectation of the regime fundamental, $z_r$, drops below some specific value, that is, rebel if and only if $z_r \leq \bar{z}_r(Q)$. Similarly, suppose that each regime adherent chooses to abandon the regime if and only if her posterior expectation $z_a$ drops below some specific value, that is, desert the regime if and only if $z_a \leq \bar{z}_a(Q)$. Denoting the extended real numbers as $\bar{\mathbb{R}} \equiv \mathbb{R} \cup \{\infty\} \cup \{-\infty\}$, a monotone strategy profile can be expressed as a pair $(\bar{z}_a, \bar{z}_r) \in \bar{\mathbb{R}}^2$. For the remainder of the analysis we express results in terms of the posterior expectation of individuals, suppressing its dependence on $Q$.

## THE DUAL-LAYERED COORDINATION DILEMMA

In the shadow of political instability, both opponents and adherents lack a common belief (or a common interpretation of shared information) regarding structural characteristics of a regime, and this induces strategic uncertainty between political actors. Formally, each actor in our model has a normally distributed posterior expectation of the regime fundamental $\theta$, and these posterior expectations differ by their mean. By considering the distribution of posterior means among individuals within a group, we can characterize the cross-sectional beliefs of individuals within group $t$ by a normal distribution with mean $\eta_t\theta + (1 - \eta_t)Q$ and variance $\eta_t^2/\beta_t$, where $\eta_t = \beta_t/(\alpha + \beta_t)$. This distribution provides a measure of the level of heterogeneity of beliefs within a group, as well as between groups, which can be used to compare different groups according to second-order stochastic dominance. To illustrate, in the case where adherents are more informed regarding regime fundamentals than opponents, that is, $\beta_a > \beta_r$, the distribution of beliefs of regime adherents second-order stochastically dominates the distribution of beliefs of opponents.

The cross-sectional distributions of beliefs, for regime adherents and regime opponents, are strategically important because they determine the overall levels of participation within each group. For a given regime fundamental $\theta$, and given a cutoff strategy for regime opponents $\bar{z}_r$ (and noting that from Bayes's rule $Z_t^i = (1/\eta)(z_t^i - (1 - \eta)Q)$), the proportion of regime opponents who rebel is

$$\begin{aligned}\mathcal{R}(\theta; \bar{z}_r) &= \int_{-\infty}^{\bar{z}_r} \frac{\sqrt{\beta_r}}{\eta_r} \phi\left(\frac{\sqrt{\beta_r}}{\eta_r}(z_r - \eta_r\theta - (1 - \eta_r)Q)\right) dz_r \\ &= \Phi\left(\frac{\sqrt{\beta_r}}{\eta_r}(\bar{z}_r - \eta_r\theta - (1 - \eta_r)Q)\right).\end{aligned} \tag{2}$$

Similarly, for a cutoff $\bar{z}_a$, the proportion of regime adherents who support the regime is

$$\begin{aligned}\mathcal{E}(\theta; \bar{z}_a) &= 1 - \Phi\left(\frac{\sqrt{\beta_a}}{\eta_a}(\bar{z}_a - \eta_a\theta - (1 - \eta_a)Q)\right) \\ &= \Phi\left(\frac{\sqrt{\beta_a}}{\eta_a}(\eta_a\theta + (1 - \eta_a)Q - \bar{z}_a)\right).\end{aligned} \tag{3}$$

It is important to emphasize that the cutoff strategies are interdependent, meaning that $\bar{z}_a$ depends on the conjecture

5. For notational clarity, $\Phi(x) = \int_{-\infty}^{x} \phi(\theta)d\theta$ is the standard normal distribution function.

of $\bar{z}_r$ and vice versa. Together, $\mathcal{E}(\theta; \bar{z}_a)$ and $\mathcal{R}(\theta; \bar{z}_r)$ determine a critical state, or tipping point, that defines the set of regime fundamentals in which the regime succeeds, which then subsequently affects the strategic choices of regime opponents and regime adherents.

We distinguish between a regime's structural capacity, $w(\theta, \lambda)$, and a regime's ultimate ability to withstand an attack, which we refer to as the regime's strength. The former corresponds to nonstrategic attributes that contribute to a regime's survival prospects, whereas the latter follows by considering the combination of a regime's structural capacity and the active support of government members. Thus, a regime's strength is endogenously determined as it depends on the level of support the regime secures from government members. For any (symmetric) conjecture of the critical state $\hat{\theta}$, we can compute the regime's strength, which depends on the monotone best response of regime adherents and gives the threshold that regime opponents need to overcome to achieve political change.

**Lemma 1.** For any $Q$ and any pair of cutoff strategies $(\bar{z}_a, \bar{z}_r) \in \bar{\mathbb{R}}^2$, one for regime adherents, $\bar{z}_a$, and one for regime opponents, $\bar{z}_r$, there is a unique critical state $\theta(\bar{z}_a, \bar{z}_r) \in [\underline{\theta}_\lambda, \bar{\theta}_\lambda]$ such that the regime survives if and only if $\theta > \tilde{\theta}(\bar{z}_a, \bar{z}_r)$. Moreover, for a symmetric regime adherent critical state conjecture $\hat{\theta}$, the regime's strength, $\mathcal{W}(\theta|\hat{\theta})$, is strictly increasing in the regime fundamental $\theta$ and strictly decreasing in the symmetric critical state conjecture $\hat{\theta}$.

Lemma 1 expresses the forces that ultimately must come together to form an equilibrium.[6] For a given conjectured regime critical state $\hat{\theta}$, there is a best-response cutoff for regime adherents, given by $\bar{z}_a(\hat{\theta})$. From this, the level of regime adherent support is given by substitution in (3):

$$\mathcal{E}(\theta|\hat{\theta}) = \Phi\left(\frac{\sqrt{\beta_a}}{\eta_a}\left(\eta_a\theta + (1-\eta_a)Q - \hat{\theta} - \frac{1}{\sqrt{\alpha+\beta_a}}\Phi^{-1}(C_a)\right)\right).$$

This value determines the level of regime adherent support for a given regime fundamental, $\theta$, and a symmetric regime adherent conjecture of the critical state, $\hat{\theta}$. The (endogenously determined) strength of the regime, as a function of $\theta$ and $\hat{\theta}$, is given by

$$\begin{aligned}\mathcal{W}(\theta|\hat{\theta}) &= \underbrace{w(\theta,\lambda)}_{\text{Regime capacity}} + \underbrace{\lambda\mathcal{E}(\theta|\hat{\theta})}_{\text{Adherent support}} \\ &= w(\theta,\lambda) + \lambda\Phi\left(\frac{\sqrt{\beta_a}}{\eta_a}\left(\eta_a\theta + (1-\eta_a)Q - \hat{\theta} - \frac{1}{\sqrt{\alpha+\beta_a}}\Phi^{-1}(C_a)\right)\right).\end{aligned}$$

By inspection, one can see that structural characteristics of the regime and public information about structural characteristics of the regime are substitutes, where the level of substitutability is determined by the precision of public information relative to private information (i.e., $\eta_t$). Before moving on, it will be useful to consider the strength of the critical regime, which is the strength of the strongest regime that fails. By substitution, at a symmetric regime adherent critical state conjecture $\hat{\theta}$, the strength of the critical regime is

$$\mathcal{W}(\hat{\theta}) \equiv \mathcal{W}(\hat{\theta}|\hat{\theta}) = w(\hat{\theta},\lambda) + \lambda\Phi\left(\frac{\sqrt{\beta_a}}{\eta_a}\left((1-\eta_a)(Q-\hat{\theta}) - \frac{1}{\sqrt{\alpha+\beta_a}}\Phi^{-1}(C_a)\right)\right).$$

The last part of lemma 1 highlights the self-fulfilling nature of regime strength. Since the function $\mathcal{W}(\cdot)$ is strictly decreasing in $\hat{\theta}$, if regime adherents believe the regime will fail under a large set of states, that is, $\hat{\theta}$ is high, then the strength of the regime $\mathcal{W}(\theta|\hat{\theta})$ is low and the regime is indeed weak. In contrast, when regime adherents expect the regime to be fairly robust to threats, that is, $\hat{\theta}$ is low, then the strength of the regime $\mathcal{W}(\theta|\hat{\theta})$ is high and the size of regime opponent rebellion must be large in order to facilitate regime change. This feature of a regime's strength shows how a regime that relies, at least partially, on the coordinated support of adherents must rely on the beliefs of those adherents, however those beliefs are formed.

A consequence of the first part of lemma 1 is that a monotone Bayesian Nash equilibrium in our game is characterized by a triple, $(\bar{z}_a, \bar{z}_r, \tilde{\theta}(\bar{z}_a, \bar{z}_r))$, which consists of a cutoff strategy for regime adherents $\bar{z}_a$, a cutoff strategy for regime opponents $\bar{z}_r$, and the critical threshold, or tipping point, $\tilde{\theta}(\bar{z}_a, \bar{z}_r)$, induced by $\bar{z}_a$ and $\bar{z}_r$ in which the regime survives if and only if $\theta > \tilde{\theta}(\bar{z}_a, \bar{z}_r)$.

**Proposition 1.** A monotone Bayesian Nash equilibrium is characterized by the triple $(z_a^\star, z_r^\star, \theta^\star)$, which are the values that simultaneously solve the following equations,

6. It is important to observe that with an appropriate relabeling, our game can be expressed as a game of strategic complementarities; nevertheless, we maintain the interpretation to best highlight the novel results of interest.

$$P(\theta \leq \theta^\star | z_r^\star) = C_r \qquad \text{Regime opponent indifference;}$$
$$P(\theta > \theta^\star | z_a^\star) = C_a \qquad \text{Regime adherent indifference;}$$
$$\mathcal{R}(\theta^\star; z_r^\star) = w(\theta^\star, \lambda) + \lambda \mathcal{E}(\theta^\star; z_a^\star) \qquad \text{Critical state.}$$

The equilibrium characterized by $(z_a^\star, z_r^\star, \theta^\star)$ is unique for all $Q$ if and only if

$$\Omega(\mathcal{W}|\theta^\star) \equiv \eta_r \left( 1 + \min_{\theta^\star \in (\underline{\theta}_\lambda, \bar{\theta}_\lambda)} \frac{\mathcal{W}'(\theta^\star)}{\sqrt{\beta_r}\phi(\Phi^{-1}(\mathcal{W}(\theta^\star)))} \right) - 1 > 0. \tag{4}$$

For a fixed private information structure, $(\beta_a, \beta_r)$, there exists a nonempty open set $\Delta \subset \mathbb{R}^2_+$, such that the dual-layered global game of regime change has a unique monotone Bayesian Nash equilibrium if and only if $(\alpha, \lambda) \in \Delta$. Moreover, if $\partial w(\cdot)/\partial\theta$ is nonincreasing in $\lambda$, that is, $\partial^2 w(\theta, \lambda)/\partial\theta\partial\lambda \leq 0$, then $\Delta$ is bounded.

The condition that characterizes uniqueness of the monotone equilibrium in our model, namely, $\Omega(\mathcal{W}|\theta^\star) > 0$, belies an important subtlety that arises as a consequence of between-group coordination and the disparity in size between groups $\lambda$. An important component of $\Omega(\mathcal{W}|\theta^\star)$ is the marginal effect of increasing regime fundamentals on the strength of the critical regime. More specifically,

$$\mathcal{W}'(\theta^\star) = \underbrace{\frac{\partial w(\theta^\star, \lambda)}{\partial\theta}}_{A} - \underbrace{\lambda \frac{\alpha}{\sqrt{\beta_a}} \phi\left( \frac{\alpha}{\sqrt{\beta_a}}(Q - \theta^\star) - \frac{\sqrt{\beta_a}}{\eta_a \sqrt{\alpha + \beta_a}} \Phi^{-1}(C_a) \right)}_{B}.$$

This measures the marginal increase in regime strength at the critical state $\theta^\star$, as the critical state changes. The expression for $\mathcal{W}'(\theta^\star)$ is composed of two parts. The first term, $A$, comprises the marginal increase that stronger fundamentals have on the regime's capacity and is strictly positive, implying that when the critical state increases so does the structural capacity of the critical regime.

Due to strategic influences on the regime's strength from regime adherents, the marginal effect of increasing the critical state has a secondary effect. The second term, $B$, comprises the marginal effect from changes in the level of adherent support, resulting from changes in the critical state. Increasing the critical state $\theta^\star$ decreases the set of regimes that survive attack and, thus, implies that a regime adherent requires a higher signal of regime fundamentals in order to be willing to support the regime. As a consequence, the level of adherent support is strictly decreasing around the critical state. Equilibrium uniqueness requires that the improvement in structural capacity (term $A$) is not overwhelmed by the diminishing level of adherent support, so that whenever the critical state increases, the strength of the critical regime also increases. It is worth emphasizing that if regime strength were completely exogenous, then $B = 0$, and hence, this feature is a result of the feedback between the coordination dilemma of regime adherents and the coordination dilemma of regime opponents.

Recall that the parameter $\lambda$ captures physical differences, in size or strength, between the set of regime adherents and the set of regime opponents. As proposition 1 shows, physical differences between regime adherents and regime opponents affect the equilibrium set in our game. The intuition for the effect of $\lambda$ is best illustrated by the example where $\lambda_a$ represents the size of regime adherents, $\lambda_r$ represents the size of regime opponents, and $\theta$ represents regime fundamentals. Recall that in this example $\lambda = \lambda_a/\lambda_r$ and $w(\theta, \lambda) = (\lambda_r)^{-1} \cdot \theta$. We now consider taking the limit as $\lambda \to \infty$, which can be accomplished in one of two ways. Consider first the case taking $\lambda_a \to \infty$. In this case, $\partial w(\theta, \lambda)/\partial\theta$ is nonincreasing in $\lambda$, and thus as $\lambda_a \to \infty$, the physical disparity between groups becomes large without simultaneously reducing the effect of regime capacity. This implies that for sufficiently large $\lambda_a$ regime adherents can produce a relatively large effect on regime opponents via the feedback through the regime's strength. Consequently, coordinating with regime adherents becomes of utmost importance to regime opponents. By contrast, suppose that we take $\lambda_r \to 0$, then $\partial w(\theta, \lambda)/\partial\theta$ is increasing and unbounded, and the necessary and sufficient condition for uniqueness, $\Omega(\mathcal{W}|\theta^\star) > 0$, is not guaranteed to hold. When $\lambda_r$ becomes arbitrarily small, it reduces the influence of both regime opponents and regime capacity, and which reducing effect dominates ultimately determines the strength of complementarities. Importantly, proposition 1 provides a sufficient condition regarding when disparities between groups create equilibrium multiplicity; but it is not necessary.[7]

Although our main analysis focuses on the case where the monotone equilibrium is unique, it is nevertheless interesting to consider the case in which there are multiple monotone equilibria. With multiple monotone equilibria, the characterization from proposition 1 remains the same,

7. One could also allow $\partial w/\partial\theta$ to increase in $\lambda$ and impose restrictions on its behavior as $\lambda$ becomes large; a restriction related to the sensitivity of payoffs. Morris and Shin (2003, 87 n. 9) note something similar, observing that one may need to impose a Lipschitz bound on the sensitivity of payoffs.

and in particular, any monotone equilibrium will follow from a critical state satisfying (1). To understand their qualitative properties, suppose, for instance, that there are two (stable) monotone equilibria, denoted by $\underline{\theta}^\star < \bar{\theta}^\star$, and consider the monotone strategies that correspond to them, $\underline{z}_r^\star$ and $\underline{z}_a^\star$, and $\bar{z}_r^\star$ and $\bar{z}_a^\star$, respectively. At $\bar{\theta}^\star$ regime opponents are more aggressive in rebelling and regime adherents are less aggressive in supporting the regime, as opposed to $\underline{\theta}^\star$, where regime adherents aggressively support the regime and regime opponents readily abstain. These features starkly illustrate the effect of between-group coordination as they highlight how equilibrium leads groups to react to each other.

Our model highlights an important subtlety regarding adapting public policy in times of political instability. Analysts and policy makers typically base their assessments on information that is publicly available, and hence commonly known with respect to the individuals involved on the ground. Naturally, when the quality of public information is poor, analysts' predictions are also poor. At first glance, one is tempted to conclude that analysts' difficulty in making accurate predictions could be resolved if they could obtain better quality information. Unfortunately, our model suggests that there is a flaw in this seemingly straightforward conclusion. If the available information is relatively accurate, then because of its publicity, adherents and opponents are also able to condition their behavior on the same information. As a consequence of the complementarities between actors, there are multiple equilibria and the analyst's ability to predict outcomes requires them to know also how individuals select among different equilibria. This observation highlights a key trade-off affecting policy with respect to political instability. Policy makers face a nonmonotone and discontinuous relationship between the quality of information and the ability to forecast outcomes. In particular, below some particular level of public information, improving the quality of public information improves the analyst's predictions—but only up to a point. When public information is sufficiently precise there are multiple equilibria, and the theoretical prediction becomes indeterminate.[8] For the remainder of our analysis, we restrict attention to the case when the monotone equilibrium is unique.

8. It is important to distinguish our fictional analyst from a fictional econometrician. A fictional econometrician would observe a cross-section of political regimes and then make inferences drawing on this sample. As a consequence, a fictional econometrician can make estimates of the equilibrium selection (Angeletos and Pavan 2013; Grieco 2014). The analyst we discuss is akin to the type discussed in Simon (1984), corresponding to a case study analyst or journalist on the ground.

## THE REGIME'S TOOLBOX

Our model has explicitly focused attention on the dual-layered coordination problem underlying political instability. The first layer, which is by now familiar to scholars of regime change, is where regime opponents must overcome a daunting collective action dilemma in order to successfully bring about regime change (e.g., Hollyer et al. 2015; Lichbach 1995; Shadmehr and Bernhardt 2011; Tilly 1978). The second layer takes place behind closed doors: adherents of the regime must contend with a similar coordination dynamic to prevent the regime from crumbling. Taken alone, these two problems would have a similar structure, and their strategic dynamics would be a straightforward extension of existing models. However, the interdependence of the coordination dynamic of regime adherents and regime opponents creates a novel strategic link. As we will show, the de facto between-group strategic substitutability that arises from the interaction of regime opponents and regime adherents suggests that the tools governments use to keep power, that is, repression, co-optation, and censorship, have important and subtle spillover effects.

In the following sections we focus on the critical state that defines the set of regimes that survive an attempt at regime change, $\theta^\star$, to study how various government tools affect the coordination dynamic underlying political instability. Rather than explicitly consider an expected utility calculation of the regime, we simply consider a regime that wants to minimize $\theta^\star$, thus maximizing the set of regimes that survive a rebellion attempt.[9] We consider this to be a reasonable objective considering that the regime drafts its policies when it is uncertain of the exact threats that will arise in the future. Consequently, a regime's repression, co-optation, and censorship policies are likely to be somewhat sticky, due to bureaucratic drift or existing power structures (Acemoglu 2003; Dragu and Polborn 2013; Svolik 2012).

### Repression and co-optation

A novel feature of our model is that the relationship between regime opponents and regime adherents arises because it is the coordinated efforts of both groups that jointly determine outcomes. In this section we consider two possible levers open to the regime: repression and co-optation. Repression corresponds to factors that affect an individual regime opponent's expected payoff when she has actively participated in dissent activities (Davenport 2007; Ritter

9. Admittedly, because of the improper prior, this approach is a bit loose. However, it would follow from a well-defined objective function where the regime's information set is sufficiently diffuse.

2014). In our model, these motivations are captured by the parameter $C_r$, where increases in $C_r$ correspond to higher levels of repression. Co-optation refers to the insider rents that influence an adherent's desire to be part of a government that retains power (Bueno de Mesquita et al. 2003) and are captured by the parameter $C_a$. Decreases in $C_a$ correspond to increased levels of insider rents and, hence, larger efforts at co-optation.

> **Proposition 2.** The critical state $\theta^\star$ is strictly decreasing in $C_r$ and strictly increasing in $C_a$. Moreover, when the set of regime adherents $\lambda$ is sufficiently small, the regime prefers to repress, whereas when $\lambda$ is sufficiently large the regime prefers to use co-optation.

Repression works—the more a regime can punish opponents, the less willing is an individual opponent to rebel. But in addition, the more a regime can punish regime opponents, the more willing are regime adherents to support the regime, which intensifies the regime's benefit to implementing repression. So repression benefits the regime and to a greater extent than might be expected.[10] Co-optation, or insider rents, similarly affect the actions within both groups. In particular, by increasing an individual adherent's desire to support the regime, the level of regime support increases, and in anticipation of this increase, some regime opponents who would otherwise rebel are deterred.

Proposition 2 details how the participation cost of one group influences the decisions of members within both groups. The decision of opponents to rebel, and the decision of adherents to support the regime, are strategic substitutes, and, therefore, changes that directly impact the decision of members of either group are then amplified by their indirect effect on the mobilization of the other group. These results suggest that the dual-layered coordination dynamic inherent to political instability will lead regimes to treat repression and co-optation as substitutes. Because of the strategic link between regime opponents' coordination problem and regime adherents' coordination problem, manipulating the incentives of one group leads to a spillover effect on the decisions of the other group's members. A natural question is when would a regime choose co-optation rather than direct repression? On the margin, if

$$\left| \frac{\frac{d\theta^\star}{dC_r}}{\frac{d\theta^\star}{dC_a}} \right| > 1, \tag{5}$$

then repression is a more effective tool at ensuring regime survival than is co-optation. However, when inequality (5) is reversed, then resources would be better utilized by increasing the insider rents given to regime supporters, because it will ultimately lead to larger decreases in challenges to the regime than an investment of resources into repression (at similar cost margins). Importantly, the ratio expressed in (5) is inversely related to the disparity between groups, $\lambda$. Thus, as $\lambda$ becomes large, co-optation becomes a far more effective strategy to retain control of government, whereas when $\lambda$ is small, repression is the ideal tool for avoiding threats from opponents.

Finally, notice that if the regime can only deliver its co-optation benefits whenever the status quo maintains, then one would expect that an increase in co-optation would increase only a regime adherents payoff when the regime survives, that is, $u_a(1; \text{SQ})$ would increase, whereas $u_a(1; \text{RC})$ remains fixed. Recall from above that due to our payoff normalization, $C_a$ reflects this scenario, and notice that an increase in $u_a(1; \text{SQ})$ leads to a decrease in $C_a$. Taken with proposition 2, this implies that an increase in a regime adherent's status quo payoff, $u_a(1; \text{SQ})$, leads to a increase in the set of regimes that survive, that is, a decrease in $\theta^\star$.

## Censorship and propaganda

As in most settings where coordination is critical, the role of public information in our model is subtle but important in that public information motivates behavior beyond its ability to inform individuals regarding regime fundamentals—public information serves to coordinate as well as inform. Specifically, the publicity of the signal $Q$ informs an opponent (adherent) about information possessed by other opponents (adherents) and hence, how they are likely to act, and importantly, the public signal provides information about how members of the other group will act. Public information has spillover effects similar to repression, but as we will show, public information does more. It is important to emphasize that we do not consider the exact channel by which censorship operates, but instead, consider how the coordination dynamic (both within-group and between-group) are affected by public information. In this section we study the influence of public information on the dual-layered coordination dynamic we highlight. We remain agnostic regarding how different levers of censorship might affect the beliefs of individuals dif-

10. Of course, there might be a signaling effect that results from the regime's decision to repress in the first place, which we do not consider here; see Angeletos, Hellwig, and Pavan (2006) and Shadmehr and Boleslavsky (2015) for a treatment of such considerations.

ferently and only examine how, because of coordination issues, individuals in such scenarios respond differently to information.

For the purposes of comparison, we consider a benchmark where the set of regime opponents is the only strategic player. In particular, we now consider the special case of our game where there are only regime opponents and where the (nonstrategic) regime capacity is given by $w(\cdot)$. In this case, the equilibrium is characterized by an opponent cutoff $z_r^0$ and a critical threshold $\theta_0^w$ which depends only on the regime's capacity.

**Corollary 1.** Fix $Q$ and let $\lambda = 0$, then there is a monotone Bayesian Nash equilibrium, characterized by a cutoff, below which regime opponents rebel and above which regime opponents abstain, $z_r^0$, and a critical state below which the regime falls and above which the regime survives, $\theta_0^w$. Moreover, the equilibrium characterized by $(z_r^0, \theta_0^w)$ is the unique iterated dominance solution for all $Q$ if and only if $\Omega(w|\theta_0^w) > 0$.

The proof is a special case of proposition 1, where $\lambda = 0$ and the structural threshold function is $w(\cdot, 0)$, and so we omit the formal details (see proposition A.1 in the appendix; see also Hellwig 2002).

To isolate the effect of political considerations within the regime, we focus on the case where the threshold level of rebellion required to incite regime change is the same as the regime's endogenous level of strength (from lemma 1), $\mathcal{W}(\theta|\theta^\star)$. In other words, to obtain the right counterfactual we need to take a function that depends only on $\theta$, but whose values agree with the function $\mathcal{W}(\theta|\theta^\star)$. The corresponding equilibrium critical threshold $\hat{\theta}_0^{\mathcal{W}}$ is then taken from corollary 1.[11] This is the critical threshold at which the value of the critical state matches that in our model with competing sides, with the exception that the threshold is induced through the coordination problem of regime opponents alone, thereby shutting down the strategic feedback resulting from regime adherents. This allows a comparison with a regime that has the same ability to withstand an attack from opponents, but where the regime's strength is not endogenously determined. We do this to account for the difference that is attributable to the feedback between coordination problems and not the difference that results from the added strength available from the set of regime adherents.

11. Note that the uniqueness restriction is the same, namely, $\Omega(\mathcal{W}|\theta^\star) > 0$.

**Proposition 3.** If $\Omega(\mathcal{W}|\theta^\star) > 0$, then the marginal effect of public information on the critical state is given by

$$\frac{d\theta^\star(Q)}{dQ} = \left(\frac{d\theta_0^{\mathcal{W}}(Q)}{dQ}\right) \cdot \left(1 + \lambda\sqrt{\frac{\beta_r}{\beta_a}}\left(\frac{\phi\left(\frac{\alpha}{\sqrt{\beta_a}}(Q-\theta^\star) - \frac{1}{\sqrt{\eta_a}}\Phi^{-1}(C_a)\right)}{\phi(\Phi^{-1}(\mathcal{W}(\theta^\star)))}\right)\right), \tag{6}$$

where

$$\frac{d\theta_0^{\mathcal{W}}(Q)}{dQ} = -\frac{1-\eta_r}{\Omega(\mathcal{W}|\theta_0^{\mathcal{W}})}. \tag{7}$$

As regime adherents become arbitrarily well informed relative to opponents, that is, as $\beta_r/\beta_a \to 0$, or as regime opponent's physical capacity becomes large relative to regime adherents, that is, as $\lambda \to 0$, then

$$\frac{d\theta^\star(Q)}{dQ} \to \frac{d\theta_0^{\mathcal{W}}(Q)}{dQ}.$$

In our model each individual's response to public information is motivated by three distinct factors. First, an increase in the public signal $Q$ pushes upward, in the sense of first-order stochastic dominance, an individual's posterior belief of regime capacity (direct effect). Second, an increase in $Q$ suggests that the posterior beliefs of other members of the same group are higher and, thus, other members are more likely to take an action associated with high posterior beliefs (indirect within-group effect). Third, from the strategic link between groups, an increase in the public signal $Q$ implies that the average posterior belief of members of the opposing group is higher, and thus more individuals in the opposing group are more likely to take an action associated with higher posteriors (indirect between-group effect).

Proposition 3 suggests that in a game with conflict between two groups, each of which faces both within-group and between-group strategic uncertainty, the effect of public information is amplified relative to its impact when considering the behavior of only one group. To see the aggregate effect of public information on the survival prospects of the regime we examine the full marginal effect of the public signal, (6). The first term, given by (7), measures the effect on the critical state resulting from the coordination within the set of regime opponents. It is the marginal effect of the public signal on the critical threshold one obtains from using $\mathcal{W}(\theta|\theta^\star)$ as the nonstrategically influenced strength of the regime. From this we see that the effect of public information,

obtained from considering only regime opponents (with a suitably adjusted threshold function), does not fully account for the effects of public information in a context that involves between-group coordination as well as within-group coordination. In other words, even if the strength of the regime is correctly specified and measured, the source of the regime's strength is an important behavioral parameter, which if overlooked, constitutes an important omitted variable.

The second term of the product in (6) acts as a multiplier (since it always exceeds 1) that intensifies the impact of public information, and it depends on two key substantive factors. First, it depends on the physical disparity between groups, λ (where larger λ implies a larger contribution of regime adherents to regime strength). The coordination dilemma of regime adherents has a larger impact on outcomes as the importance of adherent support to regime strength gets larger. Second, the information disparity between groups, $\beta_r/\beta_a$, intensifies the effect of public information. The last term measures the proportion of the change in adherent support resulting from a change in the critical state. Taken together, these suggest that disparities (physical or informational) favoring regime adherents intensify the already disproportionate influence of public information.

To further unpack the role of information in the context of political instability, we now examine how each group reacts to the content of public information. The setup of our model, and the discussion above, leads to a natural question: how does each group exploit public information? To answer this question, recall that the posterior expectation of $\theta$ for a member of group $t$, given private signal $Z_t^i$, is given by

$$z_t^i = \mathbb{E}[\theta | Z_t^i, Q] = (1 - \eta_t)Q + \eta_t Z_t^i,$$

where $\eta_t = \beta_t/(\alpha + \beta_t)$. To isolate the strategic response to public information from the informational response to public signals we follow Morris and Shin (2003, 82) and examine what they call the publicity multiplier. Consider a marginal change in the public signal $Q$. The publicity multiplier is the ratio of the change in the private signal an individual must possess in order to remain indifferent between their actions, and the change in the private signal an individual must receive in order to retain the same posterior belief of $\theta$. In our model the publicity multiplier is different for each group and we denote the publicity multiplier for group $t$ by

$$\xi_t = \frac{-\frac{dZ_t^\star}{dQ}}{\frac{1-\eta_t}{\eta_t}}.$$

**Proposition 4.** The equilibrium posterior cutoff for regime opponents, $z_r^\star$, and the equilibrium posterior cutoff for regime adherents, $z_a^\star$, react identically to public signals. If regime adherents (opponents) receive better-quality private information than regime opponents (adherents), that is, $\beta_a > (<)\beta_r$, then the strategic response of regime adherents (opponents) to the public signal is larger than that for regime opponents (adherents), that is, $\xi_a > (<)\xi_r > 1$.

Surprisingly, proposition 4 shows that the monotone best response for each group responds identically to changes in the public signal—regardless of disparities in the quality of information available to the group. When $\beta_r < \beta_a$, then $1 - \eta_r > 1 - \eta_a$, implying that the public signal influences the posterior expectation of $\theta$ for regime opponents more than for regime adherents. Put simply, public information is relatively more informative to regime opponents regarding fundamentals than it is to regime adherents. In this case, public signals induce a stronger strategic reaction by regime adherents than by regime opponents—because adherents are more informed about regime fundamentals. Consequently, individuals with access to relatively good private information essentially disregard their informational advantage in how they respond to public information. Even when the public signal is relatively uninformative about regime fundamentals, it may still be informative about the average of other individuals' expectations.

These results elucidate why regimes are so sensitive to media outlets and, hence, why censorship and propaganda are such common tools. A commonly observed signal of weak regime fundamentals can cause regime adherents to ignore even privately held beliefs about regime strength due to fears of the aggregate response of regime opponents to commonly observed news about regime fundamentals. As a consequence, the regime's fate can have a relatively weak relationship with underlying characteristics of the regime because both opponents and adherents react strongly to public sources of information.

Remarkably, reactions to public information are not affected by informational advantages between groups. This result means that a regime cannot assure adherent support by simply informing adherents that fundamentals are strong, unless they also assure opponents. Leaders facing political instability might not necessarily benefit from blocking citizens' access to information, because of how regime insiders anticipate and respond to citizen behavior. As has been well documented (e.g., Egorov et al. 2009; Jones-Rooy 2015; Morozov 2011), there is a large degree of variation with respect to how modern autocrats censor media outlets (see also Shadmehr and Bernhardt 2015). Our model suggests that a mechanism partially responsible for this feature of modern autocrats is that

such rulers may be concerned about the response of individuals in their own regime to public information. Although an autocrat may try to keep those in government well informed about regime fundamentals, elites are concerned with potential rebellion and the consequences that follow. Our results suggest that leaders may want to keep the informedness of citizens and the informedness of elites the same, either keeping both groups relatively well informed or keeping both in the dark.

## COORDINATION FAILURE

Before concluding, our model highlights a few conceptual subtleties that arise in a model of imperfect coordination. Loosely speaking, when social scientists speak of coordination failures, they are typically referring to scenarios in which a better alignment of actions could improve social welfare (see e.g., Hardin 1982; Olson 1965; or Schelling 1960). Using the global game approach to study coordination provides a useful way of examining coordination failures because it allows us to identify when individuals could improve their welfare were it not for the behavioral frictions that result from strategic uncertainty. In what follows, we say that a coordination failure occurs if a set of individuals could improve their welfare by better aligning their actions, that is, by better coordinating.

To illustrate the intuition, consider first a benchmark where $\lambda = 0$, which then constitutes a common value coordination game. In this case, there is a unit mass of regime opponents, all of whom benefit from regime change, and there are (essentially) no regime adherents. In this case, regime change occurs if and only if the regime fundamental is such that $\theta \leq \theta_0^w$. Additionally, if $\theta > \bar{\theta}_0$, then regime change is not possible. These observations imply that in the range $(\theta_0^w, \bar{\theta}_0)$ regime change is possible and can be accomplished by increasing the size of regime opponent rebellion. Moreover, in the region $\theta \in (\theta_0^w, \bar{\theta}_0)$, regime change constitutes a Pareto improvement over what is achieved in equilibrium and, consequently, provides a formal measure of the severity of coordination failure. In other words, the region $(\theta_0^w, \bar{\theta}_0)$ captures the set of Pareto improvable levels of regime fundamentals that result from strategic uncertainty, and so increasing the critical state $\theta_0^w$ corresponds to a Pareto improvement because it decreases the set of states in which successful coordination is possible but not achieved. Unfortunately, the analysis from the benchmark breaks down in the context of competing interests.

Armed with the intuition from our benchmark, we can formally distinguish between two distinct types of coordination failures: those localized within groups and those that rely on the entire strategic environment. To begin, we focus on within-group coordination failures, which are coordination failures that result from a misalignment of actions within a specific group. These local, or within-group, coordination failures are a persistent feature of equilibrium under strategic uncertainty.

**Remark 1 (Within-Group Coordination Failure).** Fix $Q$ and let $\Omega(\mathcal{W}|\theta^\star) > 0$. There exists a nonempty set of positive measure: $(\theta_\dagger(\theta^\star), \theta^\star)$, that gives the set of states for which the regime fails as a result of a coordination failure on the part of regime adherents, and $(\theta^\star, \theta^\dagger(\theta^\star))$, that gives the set of states for which the regime survives as a result of a coordination failure on the part of regime opponents.

Within-group coordination is about the complementarities within a distinct group, holding fixed the behavior of the other group. Remark 1 establishes the existence of two distinct regions.[12] We can express the equilibrium critical state as

$$\mathcal{R}(\theta^\star) = w(\theta^\star, \lambda) + \lambda\mathcal{E}(\theta^\star), \tag{8}$$

where $\mathcal{R}(\theta^\star)$ is the critical level of opponent rebellion, and $\mathcal{E}(\theta^\star)$ is the level of adherent support at the critical state. From (8) we can derive the set of states that constitute a coordination failure for regime adherents by finding $\theta_\dagger(\theta^\star)$ defined by

$$\mathcal{R}(\theta^\star) = w(\theta_\dagger(\theta^\star), \lambda) + \lambda.$$

The interval $(\theta_\dagger(\theta^\star), \theta^\star)$ constitutes the set of regime fundamentals where the status quo fails because regime adherents did not better align their actions in support of the regime. Using a similar logic we can derive the set of states that constitute a coordination failure on the part of regime opponents, defining $\theta^\dagger(\theta^\star)$ by

$$1 = w(\theta^\dagger(\theta^\star), \lambda) + \lambda\mathcal{E}(\theta^\star).$$

The interval, $(\theta^\star, \theta^\dagger(\theta^\star))$, constitutes the set of regime fundamentals for which the status quo survives, but where a better coordinated rebellion against the regime could have accomplished regime change. Remark 1 details how a single group, by better aligning actions within the group, can improve the welfare of all individuals within that same group.

From the observation that individuals have an incentive to coordinate across groups (specifically that actions across groups are strategic substitutes), we can identify when a coordination failure results from an imperfect alignment between the aggregate actions of each group.

**Remark 2 (Between-Group Coordination Failure).** Fix $Q$ and let $\Omega(\mathcal{W}|\theta^\star) > 0$. There exists a nonempty

12. Nonemptiness and positive measure followed by continuity.

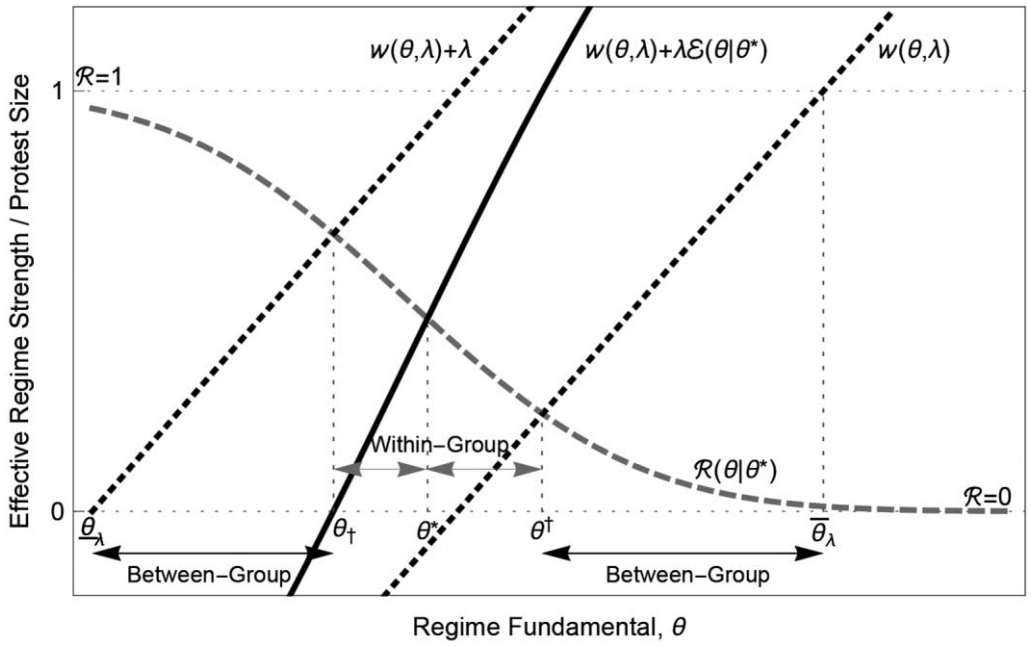


Figure 1. Coordination failure regions

set with positive measure, $(\underline{\theta}_\lambda, \theta_\dagger(\theta^*)] \cup (\theta^\dagger(\theta^*), \bar{\theta}_\lambda]$, that constitutes the region of between-group coordination failure.

The region detailed by remark 2 isolates the impact of strategic uncertainty between groups, and follows by considering the whole strategic environment.[13] After identifying within-group coordination failures we can derive the set of between-group coordination failures by considering the set of Pareto-improving action profiles (once within-group coordination frictions have been accounted for). Between-group coordination failures account for the Pareto-improving action profiles by considering the region of regime fundamentals where a single group cannot change the outcome, but where members of groups can be made better off by aligning group actions. Figure 1 illustrates these regions.

Finally, note that any level of regime fundamentals in the undominated region, that is, any $\theta$ for which $\theta \in [\underline{\theta}_\lambda, \bar{\theta}_\lambda]$, corresponds to a coordination failure. The presence of coordination failures in a model with opposed interests critically depends on how actions map into outcomes—but nothing else. In particular, the presence of a coordination failure does not depend on payoff parameters, informational parameters, or distributional assumptions. An analysis that considers how to reduce coordination failures by targeting incentives (e.g., Sákovics and Steiner 2012) is applicable only to coordination settings where common value considerations are prominent, but such analyses are of limited use in games with opposing interests. To see this, consider how a policy maker might design a welfare-enhancing policy. As can be seen, a policy maker cannot avoid the occurrence of a coordination failure and, hence, in the context of opposed interests, the relative size of groups becomes critical in designing welfare-enhancing policies. Because of coordination issues within groups, reducing the likelihood of coordination failure for one group necessarily affects the welfare of the other group adversely and, as a result, a policy maker must take into account the relative merits of prioritizing one group over another. Although we do not explore this further here, it is important to note that this feature could not be addressed in existing work.

## CONCLUSION

Building on the global-game approach, we develop a model of a dual-layered coordination dilemma between two distinct groups with opposed interests. In our model there are two groups which are distinguished by their preference toward a status quo. One group (regime adherents) enjoys the status quo while the other group (regime opponents) prefers regime change. We explore situations where collective action is important and is formalized as a threshold coordination problem (e.g., political instability, the provision of public goods, and elections, among others) and derive implications of the feedback that arises from the strategic link between regime opponents and regime adherents.

We show that the incentives of regime opponents affect the behavior of regime opponents and also generate important spillover effects on the coordination of regime adherents, and

13. Formally, the result follows by implicit differentiation: $\partial\theta_\dagger/\partial R > 0$ and $\partial\theta^\dagger/\partial E < 0$.

vice versa. We apply our model to three tools that governments commonly use to retain power: repression, co-optation, and the control of information. We show that repression and co-optation are substitutes and that regimes will trade off their use. We also examine how public information influences the outcome of a conflict between two groups whose individuals receive information in a decentralized way. In detailing this effect we show how the between-group layer of the coordination problem exacerbates the effect of public information. Surprisingly, we show that the equilibrium response to public information is identical in both groups, regardless of disparities in the quality of private information. For individuals in the group with better private information, their strategic response to public information is stronger. It is precisely because public information is more informative about the actions of those with less precise private information that the strategic response of well-informed individuals is so strong relative to its informational content.

Our results highlight a few key factors that are important for empirical scholars of political instability and regime change. First, the strategic link between regime opponents and regime adherents that we highlight constitutes an important relationship and suggests that elite-based and mass-based explanations of the process of regime change cannot be viewed in isolation. For instance, the coordination of regime adherents is an important factor determining how regime opponents coordinate. Second, our model, through between-group coordination, shows that there are important trade-offs between different tools regimes use to keep power, like repression and co-optation, that are not simply a consequence of resource constraints. Our model identifies a number of novel spillover effects, linked through equilibrium, that qualify how one should view regime change and political instability—both theoretically and empirically.

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