

# YOUTH, REVOLUTION, AND REPRESSION\*

Mehdi Shadmehr<sup>†</sup>

Peter Haschke<sup>‡</sup>

## Abstract

We develop a simple model to study the effect of age-structure on the interactions between the state and dissidents. Younger populations are more prone to protest. As the population grows younger, states that can discriminate target repression to different groups, but cannot concede discriminate, *decrease* repression. In contrast, states that can target concession, but not repression, increase repression. We test these results in non-military single-party regimes and military regimes without political parties. Moreover, we study state response to dissent in East European communist regimes in the late 1980s, showing that state response was more repressive in countries with younger populations.

*JEL* Codes: D74.

*Keywords:* Revolution, Repression, Human Rights, Youth, Regime Types, Military Regimes, Single-party Regimes.

---

\*We wish to thank Dan Bernhardt, Jose Cheibub, Luke Fitzpatrick, Justin Fox, Mark Gibney, Jude Hays, Kerim Kavakli, Patrick Kuhn, Paulina Marek, Michael Peress, Bing Powell, Kjetil Storesletten, Milan Svolik, James Vreeland, seminar participants at the University of Rochester department of political science, UIUC department of economics, and MPSA Conference.

<sup>†</sup>Department of Economics, University of Miami, and Department of Politics, Princeton University, 130 Corwin Hall, Princeton, NJ 08544. E-mail: [shadmehr@princeton.edu](mailto:shadmehr@princeton.edu) (Corresponding Author)

<sup>‡</sup>Department of Political Science, University of North Carolina–Asheville, One University Heights, Asheville, NC 28804. E-mail: [phaschke@unca.edu](mailto:phaschke@unca.edu)

# I INTRODUCTION

The Protester was Time Magazine’s person of the year in 2011. But who are the protesters? According to Time, “everywhere they are disproportionately young, middle class and educated” (Time Dec. 2011, 61). This paper focuses on the first characteristic: We develop a simple model to study the effect of age structure on protest, and investigate the state’s response to increases in the proportion of the young. The radicalism of the young and their disproportionate participation in social unrest is a robust empirical finding.<sup>1</sup> However, despite abundant evidence linking age structure to social unrest, this aspect has gone largely unstudied in the literature on protest, revolution, and repression.<sup>2</sup> Our main theoretical contribution is to show that the potential for revolution increases as the population becomes younger, but the state’s response to this threat is subtle. In particular, when the population becomes younger, repression *decreases* if the state can target repression to different age groups, but cannot target concessions, i.e., concessions have to be made to all dissidents.

Our model is based on that of Acemoglu and Robinson (2001, 2006). There is a continuum of agents distinguished by their income into the rich and the poor. Each agent lives two periods. She is young in the first period, and becomes old in the second period. Therefore,

---

<sup>1</sup>The New Left in the United States in the 1960s and 1970s mostly consisted of young people and students (Lipset 1971; Lipset and Schaflander 1971). Among the early Russian communists, “[t]he activists were well under thirty years of age and the Bolsheviks were significantly younger than the Mensheviks” (Lane 1975, 214). The *charbonnerie* revolutionary movement under the Bourbon Restoration in France “was primarily a movement of young men” (Pilbeam 1991, 22). Goldstone (1991, 2001) points to the coincidence of the historical waves of violent political crisis and population growth that resulted in the incoming of large cohorts of youth. Using survey data from the World Value Survey and Eurobarometer, MacCulloch (2005) finds that the young are more prone to revolutionary change of the society. In his quantitative study of conflict, Urdal (2004, 2) finds that “countries that experience youth bulges are more likely to experience domestic armed conflict.” See also Brunborg et al. (2006), Choucri (1984), Collier (2000), and Urdal (2006).

<sup>2</sup>Age-structure is absent in the large body of theoretical literature that features revolution and repression (Acemoglu & Robinson 2001, 2006; Besley and Persson 2011; Boix 2003; Bueno de Mesquita 2010; Buenrostro et al. 2007; Casper & Tyson 2014; Chamley 1999; Chen et al. 2014; Chen & Xu 2014; DeNardo 1985; Dunning 2008; Edmond 2013; Egorov et al. 2009; Ellis & Fender 2011, 2013; Epstein et al. 2012; Fearon 2011; Ginkel & Smith 1999; Hollyer et al. 2015; Leventoglu 2005; Lohmann 1994; Meirowitz & Tucker 2013; Persson & Tabellini 2009; Shadmehr 2015; Shadmehr & Bernhardt 2011; Svulik 2013; Tyson & Smith 2013). With the exception of Goldstone (1991, 2001) and Nordås and Davenport (2013), age structure is also absent in the mainstream sociological theories of revolutions that focus on political opportunities (Tarrow 1998; Tilly 1978, 2004), the intensity of grievances (Buechler 2004; Gurr 1970), or the nature of the state (Goodwin 2001; Parsa 2000; Skocpol 1979; Wilkinson 2009).

there are two poor groups: young poor and old poor. Each group has a representative agent, and the fraction of that group in the population is the size of this representative agent. The poor may challenge the status quo distribution of income by mounting a revolution.<sup>3</sup> The revolution succeeds if at least one poor group revolts, in which case the poor confiscate all the assets of the rich, and share the whole income evenly forever. But the revolution destroys a fraction of income. Revolution is equally costly for the young and the old, but the young enjoy their higher income for a longer period, and hence have more incentives to revolt.

The state protects the interests of the rich who want to maintain the status quo. At the beginning of each period, the state chooses a combination of repression and redistribution. When the state represses a poor group (young or old), that group cannot mobilize and revolt. But repression costs a fraction of the income of the rich. The cost is increasing in the size of the group that is repressed. Alternatively, the state can redistribute income to a poor group (young or old). The costs of redistribution depend on both the size and the age of the group: Because the young have more to gain from the revolution, the state must redistribute more to prevent them from revolting. After the state has determined the level of redistribution, and if the state has not repressed a group (young or old poor), that group decides whether to revolt.

Because conceding to the young is more expensive to the rich, one may think that as the population grows younger, the likelihood of repression always increases. However, we show that whether a state increases repression or concession hinges on whether the state can discriminately target repression and concession toward different groups.<sup>4</sup> When the state can

---

<sup>3</sup>We focus on the redistribution of wealth, however, the logic applies to other issues ranging from the extension of franchise to the termination of mandatory draft for a war.

<sup>4</sup>We interpret targeted policies as those aimed at specific opposition members who represent a specific group in society. In this interpretation, to targetedly repress the young means to identify and repress the opposition leaders associated with the young dissidents. Similarly, to targetedly concede to the young means to identify those leaders and to co-opt them or to address their demands. Alternatively, targeted repression are repressive policies directed toward a specific age group, the young or the old. For example, attacking educational institutions or the arresting of students are targeted repressive policies directed toward the young, while firing upon a group of demonstrators consisting of different age groups is an instance of untargeted repression. Restrictions on strikes, associations, and press are other examples of untargeted repression that affect all age groups. Concession refers to actions of the state that accommodate the dissidents' demands. Similar to repression, concession can be targeted or untargeted. Funding educational institutions and lowering the voting age are examples of targeted concessions directed toward the young. Retirement benefits and pensions are instances of concessions targeted to the old. In contrast, improving

target concessions, but cannot target repression, the likelihood of repression increases as the population grows younger. In contrast, when the state can target repression, but cannot target concession, the likelihood of repression *decreases* when the population becomes younger.<sup>5</sup>

To see the logic, suppose the state can target repression, but not redistribution. First, consider the simpler case when the costs of revolution are high enough that only the young impose a threat of revolution, i.e., the old non-elite have no incentive to revolt. Because a revolution is more costly for the rich than repression and redistribution, the state chooses a combination to avoid revolution. Thus, in effect, the state can either repress the young, or redistribute indiscriminately to the whole poor population at a level that prevents the young from revolting. The costs of this redistribution are not affected by increases in the proportion of the young because the state is already redistributing to the whole poor population at the level that satisfies the young. However, as the proportion of the young increases, the repression choice becomes more expensive because the state has to repress a larger fraction of the population. As a result, the state may switch from repressing the young to redistribution.<sup>6</sup>

The logic extends to the case when the costs of revolution is lower so that both the young and the old impose a threat. Then, the state can choose any one or a combination of three responses: repressing the young, repressing the old, and redistributing indiscriminately to the whole poor population. A revolution is more costly for the rich than repression and redistribution, and hence the state chooses a combination to avoid revolution. In effect, the state has three choices to prevent revolution: (1) repress both the young and the old; (2) redistribute at the minimum level that satisfies the young, which would also satisfy the old; and (3) repress the young and redistribute just enough to satisfy the old. In the latter case, the state represses the young because the chosen level of redistribution does not stop the young from

---

infrastructure such as roads, electricity, and water, and reducing corruption are examples of untargeted concessions that improve the conditions of the population as a whole.

<sup>5</sup>We use the terms concession and redistribution interchangeably in the paper.

<sup>6</sup>Although we focus on age structure, our model can be applied to settings in which citizens are divided along other characteristics such as religion and ethnicity when (1) the nature of demands are similar for both groups (e.g., both groups demand redistribution or freedom of expression), but (2) one group is more radical than the other in the sense that the state has to make more concessions to prevent that group from revolting.

revolution. The costs of the first two choices are not affected by increases in the proportion of the young. The first choice does not affect costs because the cost of repression depends on the proportion of the population that is repressed. Therefore, when the state represses all the poor, changes in the age structure of the poor do not affect these repression costs. The second choice does not affect the costs because the state is already redistributing to the whole poor population at the level that satisfies the young. However, as the proportion of the young increases, the third choice becomes more expensive because the state has to repress a larger fraction of the population. As a result, the state may switch from the third option that involves repressing the young to the second option that does not involve repression.<sup>7</sup>

The predictions of our model concern states that can target repression, but not concessions, and states that can target concessions, but not repression. The challenge is that, in the real world, states use a combination of imperfectly targeted repression and concession policies. The key step in bringing the model to the data is our observation that some institutions facilitate targeted concession, while others facilitate targeted repression. In Section 3, drawing on the literature on dictatorships (Acemoglu, Ticchi, and Vindigni 2010; Gandhi 2008; Gandhi and Przeworski 2006; Geddes 2007; Linz 2000; Lust-Okar 2006; Magaloni and Kricheli 2010; Svobik 2013), we argue that state parties provide the infrastructure to distribute benefits and address demands targetedly, and hence single-party dictatorships have institutions that facilitate targeted concessions. The institutions of military dictatorships, however, facilitate targeted repression. Therefore, dictatorships that are single-party, but not military, more closely represent states that target concession, but not repression. In contrast, dictatorships that are military, but do not have a state party, more closely represent the states that target repression, but not concession. This characterization has two

---

<sup>7</sup>More generally, the underlying mechanism is based on two observations: (1) Only the cost of the policy (repression or concession) that can be targeted may change. The costs of untargeted policies remain the same because they can either be applied to the whole population or to no one, and hence the age-structure of the population is irrelevant for the costs of untargeted policies. (2) An increase in the proportion of the more radical group (here, the young) can only *increase* the cost of the policy (repression or concession) that can be targeted. The cost of targeted concession increases because the young have more radical demands, and hence are more expensive to be bought. The cost of targeted repression can increase because, when the state represses only the young, it has to repress a larger fraction of the population.

empirical implications: (1) In military regimes without a party structure, the younger the population is, the *lower* the likelihood of repression. (2) In non-military single-party regimes, the younger the population is, the *higher* the likelihood of repression.

These results seem surprising at first: One might think that increases in the population of more radical dissidents make the state respond with the policy in which it specializes, i.e., the policy that the state can target and hence can employ more efficiently. For example, one might suspect that states that can target repression, but not concession are likely to increase repression in response to an increase in the proportion of the young. However, one must distinguish between the level of repression and the *change* in the level of repression. A state that can target repression, but cannot target concession may be more likely to use a higher level of repression than a state that can target concession, but not repression. However, in response to an increase in the proportion of the young, the states that can target repression, but not concession are also more likely to *decrease* the level of repression.<sup>8</sup> That is, our finding focuses on the *change* in the repression level.<sup>9</sup>

We test these hypotheses, using three different measures of repression: the Cingranelli-Richards (CIRI) Physical Integrity Rights Index (Cingranelli et al. 2014), the Political Terror Scales (Gibney et al. 2014), and Freedom House’s Civil Liberties index (Freedom House 2014). Our main independent variable is the ratio of the young to the old. We use regime-type data from Cheibub, Gandhi, and Vreeland (2010) and Geddes, Wright, and Frantz (2014) to constitute two samples: One for non-military single-party regimes and another for non-partisan military regimes. For each sample, we estimate the effects of the age ratio on repression.<sup>10</sup> The results provide some evidence for the predictions of our theory. The coefficients for the age ratio are statistically significant for several models, and for all models we estimated, the sign of the age ratio is consistent with the theory: Negative in the sample of

---

<sup>8</sup>We emphasize that our results are not based on assumptions about the curvature of the repression technology such as diminishing marginal benefits from more repression or convex repression costs.

<sup>9</sup>We emphasize that the driving force of our model is the comparative advantage of different regimes at targeting redistribution and repression, rather than their other characteristics.

<sup>10</sup>Because of the ordinal nature of the repression measures, we use ordered probit models. In the Online Appendix, we also estimate OLS models. The results are qualitatively the same as the ordered probit models.

non-partisan military regimes and positive in the sample of non-military single-party regimes.

Finally, we present an original case study of the state's response to dissent in the Soviet satellite states of Eastern Europe in the late 1980s. Consistent with our theoretical finding for non-military single-party regimes, we show that in countries with a younger population, states resisted reform and democratization more forcefully and used more repressive measures against the dissidents. For example, in Romania, the state forcefully resisted reform and resorted to severe repression. By contrast in Hungary, the communist regime initiated reform and was more tolerant of dissent than the other satellite states in the late 1980s. Romania had the youngest and Hungary had the oldest population among these countries.

The paper proceeds as follows. Section 2 contains the model and its analysis. In Section 3, we discuss policy targetability and its relationship with regime types. Section 4 includes the empirics. In Section 5, we study states' responses to dissent in East European communist regimes in the late 1980s. Section 6 concludes. All proofs are in the Appendix.

## II MODEL

Consider an infinite horizon overlapping generations economy with a continuum 1 of agents distinguished by their income into the elite and the non-elite, each constituting half of the population.<sup>11</sup> The elite receive a share  $\theta > \frac{1}{2}$  of the income of the society and the non-elite share the rest  $1 - \theta < \frac{1}{2}$ . Each agent lives two periods. Those living in their first period are called young, and those in their second period are called old. Agents are risk-neutral and discount future payoffs by  $\beta \in (0, 1)$ . The population growth rate is  $\rho \in [0, 1]$ . Therefore, the young constitute a fraction  $r_y = \frac{1+\rho}{2+\rho}$  of the non-elite, and the old constitute the rest,  $r_o = \frac{1}{2+\rho}$ . For simplicity, we abstract from the age structure of the elite, and assume that they behave as a coherent collectivity who maximize their payoff in each period.

The income per capita of the society in each period is  $y$ , which must be consumed in the same period. Therefore, under the status quo, the income per capita of the elite in each pe-

---

<sup>11</sup>The equal proportion of the elite and the non-elite is inconsequential for our results.

riod is  $y^e = \frac{\theta y}{\frac{1}{2}} = \theta 2y$ , which is higher than that of the non-elite,  $y^n = (1 - \theta)2y$ .<sup>12</sup> However, in each period that starts in the status quo, the non-elite can challenge the unequal economic arrangement by mounting a revolution. Revolution is an absorbent state. If revolution takes place, the elite receive 0 from that period on, and the non-elite share the whole income evenly.<sup>13</sup> However, revolution is costly and destroys a fraction  $\mu \in [0, 1]$  of the income in the period of revolution, leaving the non-elite with income per capita of  $\frac{(1-\mu)y}{\frac{1}{2}} = (1 - \mu)2y$  in the period of revolution, and  $2y$  in the following periods.

The elite control the state. That is, the state chooses policies to protect the elite against the threat of revolution. In response to the threat of revolution, in each period that starts in the status quo, the state can resort to repression or concession. If the state represses a group, the threat of revolution from that group is contained. However, repression is costly and destroys a fraction  $\omega \in [0, 1)$  of the elite's income, leaving them with income per capita of  $(1 - \omega)y^e$ . The cost of repression increases with the fraction of the non-elite population repressed. In particular,  $\omega(\cdot)$  is a function of the fraction of the population repressed such that  $\omega(0) = 0$  and  $\omega'(\cdot) > 0$ .<sup>14</sup> Alternatively, the state can redistribute a lump-sum of the income of the elite to the non-elite.

In each period that begins with the elite in power, the timing of the game is as follows. The state decides whether to repress and how much to redistribute. Then, if not already repressed, the young non-elite and the old non-elite simultaneously decide whether to revolt or not. Consumption takes place and the period ends.<sup>15</sup>

---

<sup>12</sup>Because  $y$  is the income per capita and there is a continuum 1 of agents, the total income of the society is also  $y$ . The elite receive a share  $\theta$  of the income, which is distributed equally among them. Because the elite constitute half of the continuum 1 of the total population, the elite's income per capita is  $(\theta y)/(1/2) = \theta 2y$ . The income per capita of the non-elite is calculated analogously.

<sup>13</sup>For simplicity, we assume all revolution attempts succeed. Instead, we could assume that a revolution succeeds with probability  $p(r)$ , where  $r$  is the proportion of non-elite who revolt, with  $p(0) = 0$  and  $p'(\cdot) > 0$ . The results are robust whenever the elite use repression or redistribution to mitigate the likelihood of successful revolution, i.e., the elite's optimization problem has an interior solution.

<sup>14</sup>The results are robust if we assume that a repression attempt succeeds with some probability  $q$ , or if it is more costly to repress the young than the old.

<sup>15</sup>The general setup of the model looks similar to that of Acemoglu and Robinson (2006) with the important difference that our model features heterogeneous non-elite (the young and the old, and more generally, the radicals and the moderates). In addition, our model integrates the concept of policy targetability, analyzing the effects of variations in policy targetability on state response to an increase in



For simplicity, we set up the model such that the opportunity cost of revolt is the same for both the young and the old. Alternatively, one could complicate the model so that the old have a higher opportunity cost of revolt, e.g., by allowing for saving and investment. However, this is inconsequential for our results because the incentives depend on the difference between the benefits and the costs of revolt.

**Strategies and Equilibrium.** A period strategy for the state consists of a repression policy and a redistribution policy, mapping histories without a revolution into repression and redistribution levels. A state strategy is a sequence of period strategies. More formally, the state's period strategy in period  $t$  is a pair,  $\sigma_t^e(h_t) = (s_t(h_t), T_t(h_t))$ , consisting of a repression policy  $s_t(h_t)$  and a redistribution policy  $T_t(h_t)$ , in which  $h_t$  is a history that does not include a revolution. The repression policy  $s_t(h_t) = (s_t^y(h_t), s_t^o(h_t)) \in \{0, 1\}^2$  is a pair, where  $s_t^a(h_t)$  is the repression policy targeted at group  $a \in \{y, o\}$  that maps a history  $h_t$  that does not include a revolution to a decision whether or not to repress group  $a$ .  $s_t^a(h_t) = 1$  corresponds to repress, and  $s_t^a(h_t) = 0$  corresponds to not repress. The redistribution policy  $T_t(h_t) = (T_t^y(h_t), T_t^o(h_t)) \in \Delta_{(y^e, s_t)}^2$  is a pair, where  $T_t^a(h_t)$  is a function mapping a history  $h_t$  that does not include a revolution to a decision of how much to increase group  $a$ 's income per capita, given the set of feasible redistribution policies  $\Delta_{(y^e, s_t)}^2 = \{(x_1, x_2) \in \mathbb{R}_+^2 \mid r_y x_1 + r_o x_2 \leq (1 - \omega(s_t^y r_y + s_t^o r_o))y^e\}$ . The strategy of group  $a \in \{y, o\}$  is a function  $\gamma_t^a(h_t, \sigma_t^e) \in \{0, 1\}$ , mapping a history  $h_t$  that does not include a revolution and a state strategy of period  $t$  that does not include repression of group  $a$ , i.e.,  $s_t^a = 0$ , to a decision whether or not to revolt.  $\gamma_t^a(h_t, \sigma_t^e) = 1$  corresponds to revolt and  $\gamma_t^a(h_t, \sigma_t^e) = 0$  corresponds to no revolt.

We focus on stationary strategies in which players use weakly undominated strategies. The equilibrium concept is stationary, weakly-undominated, subgame perfect Nash equilibrium, where stationarity implies that players adopt the same strategies at each date  $t$ :

$$s_t = s, \quad T_t = T, \quad \gamma_t^o = \gamma^o, \quad \gamma_t^y = \gamma^y.$$

---

Note that because the initial allocation of the income per capita of all groups and the relative the population of radical groups.

ratio of the elite and non-elite do not change, all period  $ts$  that do not start in revolution are identical except for the history of the game up to  $t$ .

**Dissidents' Strategy.** To decide whether to revolt or not, the non-elite compare the expected payoff from revolt,  $V^{an}(R)$ ,  $a \in \{y, o\}$ , to that of no revolt,  $V^{an}(\neg R; T)$ ,  $a \in \{y, o\}$ , given the redistribution policy of the state  $T = (T^y, T^o)$ . Proposition 1 characterizes the equilibrium behavior of the non-elite.

**Proposition 1** *In equilibrium, the old revolt if and only if  $\mu < \theta - \frac{T^o}{2y}$ , and the young revolt if and only if  $\mu < (1 + \beta)\theta - \frac{T^y + \beta T^o}{2y}$ .*

It follows that, absent state repression or concession, the young are willing to pay a higher cost for revolution than the old. That is, the young are more prone to revolt than the old.

**Corollary 1** *Under the status quo, i.e., when  $s = (0, 0)$  and  $T = (0, 0)$ , the young are more prone to revolt than the old. In particular, the young revolt if and only if  $\mu < (1 + \beta)\theta$  and the old revolt if and only if  $\mu < \theta$ .*

In the rest of this section, we focus on the interesting case when  $\mu < (1 + \beta)\theta$ , so that at least some group imposes a threat of revolution that might elicit state response.

**State Response.** Revolution is the worst outcome for the elite because they receive 0. Therefore, they choose a combination of repression and redistribution policies to avoid revolution and maximize their income. But feasible policies depend on the institutional settings that enable the state to target a policy toward a specific group. We analyze the elite's decisions under three different institutional settings: (1) *Untargeted repression-Untargeted redistribution*, under which the elite cannot target their repression or redistribution policies at a specific group, that is,  $s^y = s^o$  and  $T^y = T^o$ . (2) *Untargeted repression-targeted redistribution*, under which the elite cannot target the repression policy, but can target the redistribution policy, that is,  $s^y = s^o$  and  $T = (T^y, T^o)$ . (3) *Targeted repression-untargeted redistribution*, under which the elite can target their repression policy, but cannot target their redistribution policy, that is,  $s = (s^y, s^o)$  and  $T^y = T^o$ .

**Untargeted Repression, Untargeted Concession.** Let  $s_u = s^y = s^o$  be the repression strategy and  $T_u = T^y = T^o$  be the redistribution strategy. From Corollary 1, unless the state take necessary repression and redistribution policies, the young revolt when  $\mu < (1 + \beta)\theta$ , and both the young and the old revolt when  $\mu < \theta$ . If the state represses, the threat of revolution is contained and the elite get

$$V^e(s_u = 1, T_u = 0) = (1 - \omega(1))y^e. \quad (1)$$

Alternatively, the state can implement a redistribution policy. Because  $T^y = T^o$ , from Proposition 1, the minimum transfer that neutralizes the young, denoted by  $\hat{T}_u$ , is the one that makes the young indifferent between revolt and no revolt. That is,  $\mu = (1 + \beta)\theta - \frac{(1+\beta)\hat{T}_u}{2y}$ , implying

$$\hat{T}_u = \left(\theta - \frac{\mu}{1 + \beta}\right) 2y. \quad (2)$$

Because  $\hat{T}_u$  is increasing in  $\beta$ , and  $\beta = 0$  for the old,  $\hat{T}_u$  is also sufficient to neutralize the old. Moreover,  $\hat{T}_u$  is a feasible redistribution policy because  $y^e > \hat{T}_u$ . To choose between repression and redistribution, the state compares the corresponding payoffs of the elite. Their payoff from redistribution at  $\hat{T}_u$  is

$$V^e(s_u = 0, T_u = \hat{T}_u) = y^e - \hat{T}_u = \frac{\mu}{1 + \beta} 2y. \quad (3)$$

Hence, the state represses if and only if  $V^e(s_u = 1; T_u = 0) > V^e(s_u = 0; T_u = \hat{T}_u)$ . Substituting from equations (1) and (3), the state represses if and only if  $\omega(1) < \hat{\omega}_u$ , with

$$\hat{\omega}_u = -\frac{\mu}{(1 + \beta)\theta}. \quad (4)$$

Proposition 2 formalizes these results.

**Proposition 2** *In equilibrium, the state represses if  $\omega(1) < \hat{\omega}_u$ , and redistributes  $\hat{T}_u$  otherwise.*

**Untargeted Repression, Targeted Concession.** The state can discriminately redistribute the income of the elite to the young or the old non-elite, but does not have the

means to repress discriminately; that is, repression is untargeted and can only be made against all the non-elite indiscriminately. Let  $s \in \{0, 1\}$  be the state's repression strategy and  $T = (T^y, T^o) \in \Delta_{(y^e, s)}^2$  be its redistribution strategy. Because the state represents the interests of the elite and revolution is the worst outcome for the elite, the optimization problem of the state is to maximize the payoff of the elite subject to no revolution. A redistribution policy  $(T^y, T^o)$  transfers a per-capita amount of  $r_y T^y + r_o T^o$  from the elite to the non-elite. If the state represses,  $s = 1$ , it costs the elite a fraction  $\omega(1)$  of their income. Thus, the optimal policy of the state, denoted by  $\hat{\sigma}^e$ , is

$$\begin{aligned} \hat{\sigma}^e &= \arg \max_{s, (T^y, T^o)} (1 - s \omega(1)) y^e - r_y T^y - r_o T^o \\ &\text{s.t. no revolution} \end{aligned}$$

When  $\theta \leq \mu < (1 + \beta)\theta$  the young impose a threat, but the old do not. In response, the elite can either repress or redistribute enough to contain the threat of the young. However, the state indiscriminately represses both the young and the old if it decides to repress. When  $\mu < \theta$  both the young and the old impose a threat. The elite can either repress them both, or redistribute to the young and to the old to neutralize their incentives to revolt. In equilibrium, the elite choose the strategy that yields the highest payoff. Therefore, as the cost of repression increases, the elite tend to accommodate the non-elite via concession. Proposition 3 characterizes the state's equilibrium strategy.

**Proposition 3** *In equilibrium:*

- If  $\theta \leq \mu < (1 + \beta)\theta$ , then the state represses all the non-elite if  $\omega(1) < \bar{\omega}^y$ . Otherwise, the state takes the redistribution policy  $(T^y, T^o) = (\bar{T}^y, 0)$ .
- If  $\mu < \theta$ , then the state represses all the non-elite if  $\omega(1) < \tilde{\omega}$ . Otherwise, the state takes the redistribution policy  $(T^y, T^o) = (\tilde{T}^y, \tilde{T}^o)$ ,

where  $\bar{\omega}^y = \frac{r_y}{\theta} ((1 + \beta)\theta - \mu)$ ,  $\tilde{\omega} = 1 - \frac{\mu}{\theta} (1 - r_y \beta)$ ,  $\bar{T}^y = ((1 + \beta)\theta - \mu)2y$ ,  $\tilde{T}^y = (\theta - (1 - \beta)\mu)2y$ , and  $\tilde{T}^o = (\theta - \mu)2y$ .

**Targeted Repression, Untargeted Concession:** The state can discriminately apply repression against the young or the old, but cannot redistribute discriminately. Let  $s = (s^y, s^o) \in \{0, 1\}^2$  be the state's repression strategy and  $T$  be its redistribution strategy.

As before, when  $\theta \leq \mu < (1 + \beta)\theta$  the young impose a threat, but the old do not. In response, the elite can either repress the young or redistribute enough to contain their threat. However, the redistribution is to the whole non-elite because the elite do not have the institutions that enable them to only target the young. When  $\mu < \theta$  both the young and the old impose a threat. The elite can either repress them both, repress the young and redistribute enough to contain the old, or redistribute at a level that neutralizes the young's incentive to revolt. Because redistribution is made to the whole non-elite the latter level of redistribution is also enough to contain the threat of the old. In equilibrium, the elite choose the strategy that yields the higher payoff. Proposition 4 characterizes the state's equilibrium strategy.

**Proposition 4** *Suppose  $\theta \leq \mu < (1 + \beta)\theta$ . In equilibrium, the state represses the young if  $\omega(r_y) < \hat{\omega}_u$ , otherwise, redistributes at the level  $T = \hat{T}_u$ . Suppose  $\mu < \theta$ . In equilibrium:*

- *If  $\omega(1) < \hat{\omega}$ , the state represses all the non-elite provided  $\omega(1) - \omega(r_y) < \hat{\omega}^o$ . Otherwise, represses only the young and redistributes at the level  $T = \hat{T}^o$ .*
- *If  $\omega(1) \geq \hat{\omega}$ , the state redistributes at a level  $T = \hat{T}_u$  with no repression provided  $\omega(r_y) \geq \hat{\omega}^y$ . Otherwise, represses the young and redistributes at the level  $T = \hat{T}^o$ ,*

*where  $\hat{\omega} = 1 - \frac{\mu}{(1+\beta)\theta}$ ,  $\hat{\omega}^o = 1 - \frac{\mu}{\theta}$ ,  $\hat{\omega}^y = \frac{\mu}{\theta} \frac{\beta}{1+\beta}$ , and  $\hat{T}^o = (\theta - \mu)2y$ .*

**Policy Targetability and Repression.** How does the likelihood of repression change as the population grows younger? To answer this question, we recognize that the cost of revolution varies from one country-year to another, and hence we assume that it has a distribution. We then use the results in Propositions 2, 3, and 4 to investigate how changes in the proportion of the young affect the likelihood that repression is observed. Because the young are more prone to revolt than the old, one might expect that as the population grows younger the

likelihood of repression increases. However, Proposition 5 shows that whether shifts in the age structure of the population increase or decrease the likelihood of repression hinges on the institutions of the state that facilitate or hinder targeted repression and targeted concession.

**Proposition 5** *As the population grows younger: (1) States that use untargeted repression, but targeted concession are more likely to use repression, but (2) states that use targeted repression, but untargeted concession are less likely to use repression. Moreover, changes in the age structure do not change the behavior of the states that use untargeted repression and untargeted concession.*

To formalize the content of Proposition 5, let  $P_{uu}$  be the probability of repression under untargeted repression and concession,  $P_{tu}$  be the probability of repression under targeted repression and untargeted concession, and  $P_{ut}$  be the probability of repression under untargeted repression and targeted concession. In equilibrium,  $P_{uu}(r_y) = P_{uu}(r'_y)$ ,  $P_{tu}(r_y) \geq P_{tu}(r'_y)$ , and  $P_{ut}(r_y) \leq P_{ut}(r'_y)$ , for all  $r_y \leq r'_y \in (0, 1)$ .

We discussed the intuition in the Introduction. Increases in the proportion of the young may only make the targetable policy more expensive. Consider the case where the state concession policy can be targeted, but its repression policy cannot. If the state is already using repression, changes in the age structure do not affect the state policy because repression, being untargeted, is directed toward the whole non-elite, and hence a change in the age profile of the non-elite does not change the costs or benefits of repression. However, if the state is making concessions to the young, increases in the proportion of the young make such concessions more costly because the young are more expensive to be bought. This can make the state switch from concession to repression. In contrast, when repression is targeted, but concession is not, increases in the proportion of the young has the opposite effect. If the state is repressing the whole non-elite or conceding to the whole non-elite, increases in the proportion of the young does not affect the state policy. However, if the state is repressing the young and conceding to the old, increases in the proportion of the young makes repression more costly.

These results imply that increases in the relative size of one group can affect the other's welfare by influencing the state's response. When the state can target repression, but cannot target redistribution, increases in the fraction of the young may benefit the old because it may cause the state to switch from repressing the young to redistributing to the whole population at a level that prevents the young's revolt—which is higher than what the old would get when the state represses the young and redistributes at a level that prevents the old from revolting. In contrast, when the state can target redistribution, but cannot target repression, increases in the fraction of the young may cause the state to switch from redistribution to untargeted repression, thereby hurting the old. These results resonate with Waldfogel (2003) and George and Waldfogel (2003) who empirically investigate the effects of changes in minority group size on the welfare of the majority in media markets with differentiated products.

### III POLICY TARGETABILITY AND REGIME TYPES

Policy targetability refers to the ability of the state to discriminately apply a policy toward the advocates of a specific group (see footnote 5). State institutions affect the targetability of policy. For example, a state with strong, professional intelligence and security agencies is more able to narrowly target repression to specific groups or individuals than a state that lacks these organizations.<sup>16</sup> In this section, we identify some institutions that facilitate or hinder targeted repression and concession. In particular, parties and legislatures are institutions that provide the infrastructure for targeted concession, while the institutions of military regimes facilitate targeted repression.

---

<sup>16</sup>The targetability of policy also depends on the structure of society and the nature of policy. For example, it is easier to target a policy to a group with a distinct skin color than to target the same policy to a group with certain religious beliefs (structure of the society). In comparison with restrictions on strikes, imposing curfew is more likely to affect the whole population than a specific group. In turn, restricting strikes is a less targetable repressive policy than restricting opposition meetings because strikers' agenda might be local economic issues (with both political activists and non-political workers participating), while the agenda of an opposition meeting is political. To ban the latter mostly targets the dissidents, but to ban the former targets both the militant workers and the workers who are only concerned with their day-to-day life (the nature of the policy).

The literature on the political institutions of dictatorships argues that parties and legislatures are the institutions through which states distribute benefits and make policy concessions (Collier 1982; Gandhi 2008; Gandhi and Przeworski 2006; Geddes 2007; Wintrobe 1998). In dictatorships, a “party offers individuals willing to collaborate with the regime a vehicle for advancing their careers within a stable system of patronage” (Gandhi 2008). “Ruling parties should thus be understood as giant patronage systems” (Magaloni and Kricheli 2010, 128) through which regimes distribute benefits and privileges. “They provide their officials and activists with benefits that give them a stake in the regime” (Geddes 2007). For example, Linz (2000) shows that the youth branch of the ruling party in Nazi Germany and Soviet Russia were institutions that provided the young the opportunity to advance their careers and ambitions. “A strong party organization is required to acquire information about citizens’ loyalties” (Magaloni and Kricheli 2010, 128) in order to targetedly distribute privileges and benefits to co-opt citizens and buy off their support. That is, parties provide the infrastructure necessary to targetedly redistribute wealth, privileges and benefits.

Legislatures lower the transaction costs of bargaining between the state and oppositions by providing institutional settings for “controlled bargaining” and communication without the threat of punishment (Gandhi 2008; Gandhi and Przeworski 2006). In some dictatorships such as Jordan, deputies compete for “access to state resources,” and “parliament is a basis from which one can call upon the ministers and bureaucrats to allocate jobs to constituents” (Lust-Okar 2006). Legislators are chosen via a combination of vetted election and selection which allows the regime to make targeted concessions. The Polish Communist Party’s plan in the late 1980s to allow 25 percent Catholic deputies in the Polish Parliament is one example. King Hussein’s offer to allow the Muslim Brotherhood in Jordan to influence educational and religious policies via legislature is another (Gandhi 2008). Therefore, legislatures in dictatorships provide institutional settings for targeted policy concessions.<sup>17</sup>

---

<sup>17</sup>As Magaloni and Kricheli (2010) discuss in their extensive review, Parties and legislatures in dictatorships serve other functions too, including deterring the threat of military coup (Geddes 2007) and mitigating the principal-agent problem between the leader and his allies (Boix and Svobik 2013).



Military regimes are defined as regimes with a military officer as the effective head of the state (Cheibub et al. 2010; Gandhi and Przeworski 2006). Those who run the state have close links to military and intelligence agencies, insider information about military and intelligence procedures, and expertise in coercive measures and intelligence gathering. In fact, in many countries, domestic intelligence agencies were originally created by military professionals or formed as a branch of military intelligence first, and separated from the military only later.<sup>18</sup> These features improve the efficiency of intelligence agencies to identify dissidents and narrowly direct the repressive measures toward them. The military expertise of the ruling circle and their close connections with military and intelligence agencies make communications and procedures regarding repression decisions more efficient, and reduce principal-agent problems between the government and the military (Acemoglu et al. 2010; Svobik 2013). That is, the ruling circles in military regimes have more control over the actions of the agents of repression. These institutional settings allow military regimes to implement targeted repression more effectively than other dictatorships. Moreover, relative to single-party dictatorships, military regimes have less effective bureaucratic procedures to targetedly distribute benefits and privileges to co-opt dissidents.

Although most military regimes do not have a state party or a formal legislature, a few do (Geddes 2007; Gandhi and Przeworski 2006). We thus compare military regimes that lack party systems (non-partisan military regimes) with single-party regimes that are not ruled by military officers (non-military single-party regimes). Our arguments suggest that non-military single-party regimes are more capable of targeted concession than non-partisan military regimes. In contrast, the non-partisan military regimes are more capable of targeted repression than non-military single-party ones. In summary, the arguments of this section together with the implications of our model (Proposition 5) yield two empirical hypotheses:

---

<sup>18</sup>For example, the Department of National Intelligence (DINA) in Chile was formed in the 1970s by combining several independent intelligence agencies of armed forces (Philip 1985). The National Intelligence and Security Organization (SAVAK) of the Pahlavi regime in Iran was formed in the 1950s mainly by military officers, and although it took over the task of internal security from army intelligence unit, it remained under the command of military officers until the end of the regime (Fardust 1999).

**Hypothesis 1:** In military regimes without a party structure, the younger the population is, the *lower* the likelihood of repression.

**Hypothesis 2:** In non-military single-party regimes, the younger the population is, the *higher* the likelihood of repression.

We emphasize that we do not hypothesize that non-partisan military regimes are less repressive than non-military single-party regimes.<sup>19</sup> Instead, our hypotheses are about how these regime types respond to increases in the proportion of the young. The level of repression in the non-partisan military regimes can be higher than non-military single-party regimes. However, as the proportion of the young increases, non-partisan military regimes decrease the level of repression, while non-military single party-regimes increase it.

## IV DATA AND EMPIRICS

We test Hypotheses 1 and 2, using country-year data on repression, age structure, and regime type.<sup>20</sup> As our dependent variables, we employ three measures of repression. The first is the Cingranelli-Richards (CIRI) Physical Integrity Rights Index (Cingranelli et al. 2014). It is an additive index constructed from the sum of four indicators measuring torture, extrajudicial killings, political imprisonment, and disappearance. Each indicator can take on the values of 0, 1, and 2, corresponding to frequent, occasional, and no occurrence of the respective violation type. As such, the CIRI index is an ordered variable ranging from 0 (the most frequent violation of physical integrity rights) to 8 (no violation). We invert the index so that 0 means no violation and 8 means the most frequent violation of physical integrity rights.

As a second measure of repression we use the Political Terror Scales (Gibney, Cornett, Wood, & Haschke 2014). For each country-year, they assign values on a 5-point ordinal scale. A score of 1 indicates that a country is under a “secure rule of law, people are not imprisoned

---

<sup>19</sup>Indeed, summary statistics for our two samples (Table 1) suggest the opposite.

<sup>20</sup>Summary statistics for our dependent variables and covariates are in Table 1 below. Table 4 in the Online Appendix lists each country-year’s regime type based on Geddes et al. (2014) and Cheibub et al. (2010). Table 3 in the Online Appendix contains the sources of our data.

for their view, and torture is rare or exceptional. Political murders are extremely rare.” By contrast, a score of 5 implies that “murders, disappearances, and torture are a common part of life.” Two Political Terror Scales are available. The first (PTS-A) is based on the Amnesty International’s *Annual Reports*, and the second (PTS-S) is based on the U.S. State Department’s annual *Country Reports on Human Rights Practices*. We use PTS-S because the CIRI measure already relies on the Amnesty International reports (Cingranelli et al. 2014).

TABLE 1  
Summary Statistics

Non-Military Single Party Regimes					
Variable	Min	Max	Mean	Median	Std. Dev.
CIRI	0	8	4.08	4	2.17
PTS-S	1	5	2.77	3	0.94
Civil Liberties	2	7	5.24	5	1.35
Ratio of Young to Old	0.41	1.53	0.92	0.94	0.21
Executive Constraints	1	7	3.09	3	1.45
GDP per capita (log)	5.34	10.52	7.68	7.51	1.08
Population (log)	6.05	14.09	9.11	9.12	1.55
Civil War	0	1	0.14	0	0.35
Intl. War	0	1	0.03	0	0.17
Non-Partisan Military Regimes					
Variable	Min	Max	Mean	Median	Std. Dev.
CIRI	0	8	4.37	4	2.01
PTS-S	1	5	3.00	3	1.00
Civil Liberties	3	7	5.47	5	1.06
Ratio of Young to Old	0.47	1.26	0.97	0.99	0.14
Executive Constraints	1	7	1.67	1	0.98
GDP per capita (log)	5.56	9.91	7.34	7.03	0.93
Population (log)	6.69	12.08	9.07	8.85	1.21
Civil War	0	1	0.22	0	0.41
Intl. War	0	1	0.04	0	0.18

To further examine the robustness of our results, we also use the *Freedom House* Civil Liberties index as a third measure of repression. This index measures a variety of concepts grouped into four broad categories: Freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. It has a range from 1 to 7 which we invert, so that 1 is associated with the highest and 7 with the lowest level of freedom. We recognize that this index is not a good measure of repression defined as state actions that raise the cost of political protest, but we use it to further check the robustness of our results that use CIRI and PTS-S measures. In particular, the Civil Liberties index also measures religious freedom, the treatment of various distinct groups such as LGBT people, the right to own property, the undue influence of organized crime on private businesses, and gender equality, choice of marriage partners, and even family size (Freedom House 2014).

Regime type data are from Geddes, Wright, and Frantz (2014) and Cheibub, Gandhi, and Vreeland (2010). Geddes et al. (2014) categorize dictatorships into single-party, military, personalist, monarchies, and their hybrids, while in Cheibub et al. (2010), dictatorships are divided into three types: civilian, military, and monarchy. The Cheibub et al. typology does not include information on the party structure of regimes, and the typology of Geddes et al. includes personalist regimes that have a military leader. Therefore, we combine the information from these two sources. For non-military single-party regimes, we consider all single-party regimes (and their hybrids) from Geddes et al. that are not military regimes according to Cheibub et al. For non-partisan military regimes, we include all military regimes from Cheibub et al. that are not single-party or single-party hybrid according to Geddes et al. This procedure excludes single-party-military hybrid regimes for which the theory does not provide a clear prediction: These regimes have both the infrastructure for targeted redistribution (party structure) and the institutional mechanisms for targeted repression. Which institutional characteristic dominates and determines the state's response, depends on the relative prevalence of relevant institutions and the costs of each response.

To capture the age-structure of the population, we use U.N. population data (United

Nations 2013) to construct our measure for the ratio of the young to the old adults. We need to make a decision where to set the minimum and maximum age. Clearly, it is unreasonable to include 5-year-olds or 90-year-olds in the analysis as they are irrelevant for political activities. Ideally, we want to choose the minimum age somewhere in the late teens, which is about the time when people are socialized into political activities, and the maximum age around 60 because by then a person's physical conditions are unlikely to allow political activism for most people. However, data are available only for 5-year age groups. For example, the minimum age can be 10, 15, or 20. The measure used for the results that we present here is the ratio of the population between 15 and 29 to the population between 30 and 64. However, we have used three other measures, and the results are robust.<sup>21</sup>

We control for variables frequently used in the literature (Conrad and Moore 2010; Davnport 2007; Gandhi 2008; Haschke 2014; Henderson 1991, 1993; Mitchell and McCormick 1988; Poe and Tate 1994; Poe, Rost, and Carey 2006; Vreeland 2008): past level of repression, institutional constraints on the executive branch (from PolityIV, Marshall 2013), income per capita (real GDP per capita from Penn Tables, Heston et al. 2012), civil war (from PRIO, Gleditsch et al. 2002), and international war (from COW, Ghosn et al. 2004, Sarkees and Wayman 2010). Past repression is consistently found to be one of the most important factors explaining repression. Shadmehr and Bernhardt (2011) and Shadmehr (2015) develop formal models that imply that past and present levels of repression are correlated because repression policies have inertia. Constraints on the executive branch limit the abilities of the state to use coercive measures. Civil war and international war might increase repression because states faced with threats are more likely to respond with repression (Gurr 1986).

Moreover, some researchers argue that higher income per capita may decrease repression because it decreases dissent and conflicts over scarce resources among the population (Henderson 1991; Poe and Tate 1994; see Shadmehr (2014) and Haschke (2014) for critiques.).

---

<sup>21</sup>In particular, we have used the ratio of the population between 15 and 29 to the population between 30 and 59, the ratio of the population between 20 and 29 to the population between 30 and 64, and the ratio of the population between 20 and 29 to the population between 30 and 59.

However, empirical results on the effect of income on repression are mixed. For example, Gandhi (2008) does not find any effect of per capita income on civil liberties. Similarly, Conrad and Moore (2010) do not find significant effects of income on the likelihood that a state terminates torture. Overall, as Davenport (2007, 14) summarizes in his review of the literature, “one does not find a detailed discussion of why economic development yields an influence or why GNP measures this feature adequately.” We also include time dummies to capture any trends that affect all countries, for example, an increase in the global culture for defending human rights, the collapse of communism, US foreign policy, and the like.

Because of the ordered nature of the dependent variables, CIRI, PTS-S, and Civil Liberties, we use ordered probit models to test our hypotheses.<sup>22</sup> In particular, let  $r_{it}^*$  be the latent continuous variable that captures repression,  $a_{it}$  be the ratio of the young (between 15 and 29) to the old (between 30 and 64), and  $\mathbf{x}_{it}$  be the vector of covariates. Then,

$$\begin{aligned} r_{it}^* &= \sum_{c=m}^M \delta_c d_{it-1}^c + \alpha a_{it} + \mathbf{x}_{it}'\boldsymbol{\beta} + \mu_t + \epsilon_{it}, \\ r_{it} &= c \text{ if } s_{j-1} < r_{it}^* \leq s_j, \quad j = m, \dots, M, \end{aligned}$$

where  $d_{it-1}^c$  is a binary indicator that take on 1 when the value of the lagged repression measure  $r_{it-1}^c$  is  $c$ , and is 0 otherwise.<sup>23</sup> Finally,  $\mu_t$ 's denote a full set of time effects that capture common shocks, and  $\epsilon_{it}$ 's are the idiosyncratic errors. To test Hypothesis 1, we estimate the models on the sample of non-partisan military regimes. To test Hypothesis 2, we estimate them on the sample of non-military single-party regimes. Tables 2 and 3 present the results.<sup>24</sup>

The coefficient of our variable of interest, the ratio of young to old, has the expected sign in all regressions. Among the four regressions that use our two main measures of repression, CIRI and PTS-S, the coefficient of age ratio is significant at the 5% level in two and at 10%

---

<sup>22</sup>We also estimate OLS models. The results are reported in Tables 1 and 2 in the Online Appendix and are qualitatively the same as the ordered probit models.

<sup>23</sup>For CIRI,  $m = 0$  and  $M = 8$ . For PTS-S,  $m = 1$  and  $M = 5$ . For Civil Liberties  $m = 1$  and  $M = 7$ .

<sup>24</sup>We considered fixed effect specifications, but did not perform them because several control variables such as the lags, executive constraints, and GDP per capita do not satisfy the *strict exogeneity* assumption required for the consistency of the common fixed effect estimators. Generally, accounting for unobserved heterogeneity in dynamic models is difficult. In particular, the common MLE generates inconsistent coefficients in dynamic probit models (Wooldridge 2002, 493-6).

TABLE 2  
Non-Military Single-Party Regimes

Regressor	CIRI 0–8	PTS-S 1–5	Civil Liberties 1–7
Ratio of Young to Old	0.59** (0.29)	0.49* (0.29)	0.13 (0.32)
Executive Constraints	−0.07** (0.03)	−0.09** (0.03)	−0.24** (0.04)
GDP per capita (log)	0.02 (0.06)	0.04 (0.05)	−0.05 (0.06)
Population (log)	0.22** (0.04)	0.18** (0.04)	0.12** (0.04)
Civil War	0.27** (0.13)	0.48** (0.13)	0.29** (0.14)
Intl. War	0.03 (0.20)	0.02 (0.22)	0.44* (0.24)
<i>N</i>	505	614	780
pseudo- <i>R</i> <sup>2</sup>	0.98	0.97	0.98
Time Dummies	yes	yes	yes
Lagged Dep. Variable	yes	yes	yes

Shown are coefficients for ordered probit regressions and standard errors in parentheses; \*\* indicates significance at  $p < 0.05$ , \* indicates significance at  $p < 0.1$ .

level in another model. In particular, in the sample of non-military single-party regimes, the coefficient on the ratio of the young to old is positive, indicating that the younger is the population, the higher is the likelihood of repression. In contrast, in the sample of non-partisan military regimes, this coefficient is negative, indicating that the younger is the population, the lower is the likelihood of repression. Given the wide range of concepts measured by the Civil Liberties index, it is not surprising that the age ratio coefficient is not significant.

To gauge the magnitude of the effect of changes in age ratio on the likelihood of repression, first, consider non-partisan military regimes. Keeping the control variables at their medians, raising the age ratio from its median by one standard deviation reduces the prob-

TABLE 3  
Non-Partisan Military Regimes

Regressor	CIRI 0–8	PTS-S 1–5	Civil Liberties 1–7
Ratio of Young to Old	−0.34 (0.65)	−1.35** (0.63)	−0.53 (0.54)
Executive Constraints	−0.11* (0.07)	−0.15 (0.07)	−0.32** (0.07)
GDP per capita (log)	0.14** (0.07)	0.08 (0.07)	−0.18** (0.07)
Population (log)	0.14** (0.05)	0.14** (0.05)	−0.13** (0.05)
Civil War	0.34** (0.17)	0.25 (0.18)	0.40** (0.19)
Intl. War	−0.01 (0.42)	0.19 (0.39)	0.95** (0.41)
<i>N</i>	343	406	551
pseudo- <i>R</i> <sup>2</sup>	0.93	0.91	0.93
Time Dummies	yes	yes	yes
Lagged Dep. Variable	yes	yes	yes

Shown are coefficients for ordered probit regressions and standard errors in parentheses; \*\* indicates significance at  $p < 0.05$ , \* indicates significance at  $p < 0.1$ .

ability of repression by 2.4% from 31.4 to 29.0.<sup>25</sup> Next, consider non-military single-party regimes. Keeping the control variables at their median, raising the age ratio from its median by one standard deviation increases the probability of repression by 4.7% from 23.8 to 28.5.

As expected, past repression, larger populations, and civil war are associated with higher levels of repression, while constraints on the executive branch decrease repression. GDP per capita is significant only in a subset of models and in four instances has a positive sign, indicating that an increase in per capita income increases the likelihood of repression. A possible explanation is that regimes may trade off between economic performance and polit-

<sup>25</sup>When using the CIRI measure of repression (which ranges from 0 to 8), we say the state uses repression in a country-year when its CIRI measure is above 4. Qualitatively similar results obtain if we include 4, or if we repeat this exercise for the PTS-S measure of repression.



ical freedoms to maximize their survival: In poor economic contexts, regimes substitute poor economic performance by being more politically accommodating. For example, the Pahlavi regime raised repression in the mid-1970s in the midst of the oil boom. These years were the heyday of the regime’s intelligence agency (SAVAK) and dissent activities were severely punished. However, in the late 1970s when the “overheated” economy slowed down and inflation skyrocketed, the regime allowed limited liberalization, tolerated some opposition activities, tamed SAVAK, and freed some political prisoners (Abrahamian 1982; Milani 2011).

## V STATE RESPONSE IN SOVIET SATELLITE STATES IN THE 1980S

In the late 1980s, the Soviet regime announced that it would not intervene in the internal affairs of its satellite states, implying that if these regimes were toppled, Moscow would not seek to restore them. In response, dissidents in the East European communist countries mobilized, demanding political and economic reforms. However, the state’s response varied across different countries: in some, the state initiated reforms (e.g., Hungary), while in others, the state responded with severe repression (e.g., Romania). Our model provides insights to explain these variations. Because these regimes were non-military single-party regimes, our model predicts state responses to be more repressive in countries with younger populations.<sup>26</sup>

In Hungary, the state initiated reform. There were two main instances of popular protest (the demonstrations of March and June of 1988) that led to some arrests by the police. But even then, the state was accommodating as the official media reported the events, and later the government sanctioned ceremonial events to praise Imre Nagy, the leader of the 1956 Hungarian anti-Soviet revolution that ended in Soviet invasion and the execution of Nagy. The following two years, leading up to democratic elections in 1990, witnessed continuous reforms backed by some demonstrations and strikes. However, by mid 1988, prolonged protest

---

<sup>26</sup>This section is *not* a test of any of our hypotheses as we do not control for many other factors that influenced the outcome in these countries. It is rather an illustration of the explanatory power of the model that provides insights (not complete answers) to explain variations in states’ responses to dissent.

was no longer necessary to force the state to accommodate the dissidents' demands.

The Bulgarian state under Zhivcov was quite repressive. The opposition organized demonstrations in October and November 1989 around the issue of political reform that led to the replacement of Zhivcov by Mladenov with the promise of reform. From that point, the state gradually reformed until the democratic parliamentary election of June 1990. The opposition organized some demonstrations, but the replacement of Zhivcov by Mladenov was the sign of the regime's essential agreement to democratize.

Poland moved step by step toward democracy, and each serious step made possible by popular protest. Opposition activities accelerated in 1987, leading to clashes with police in the demonstrations of May 1987. In April and August 1988, a wave of strikes and demonstrations broke out "which were only brought to an end with the promise of negotiations between the authorities, the Catholic Church, and representatives of Solidarity" (White 2001). Although Rakowski replaced Messner as the new prime minister in the Fall, he offered only selective negotiations with the "constructive oppositions," not "aggressive anti-communists." The party plenum was even against union pluralism as late as January 1989. When the regime offered negotiation with opposition, it was conditional on Solidarity accepting to be "a part of socialism." The regime conceded to parliamentary elections, but 65 percent of the seats in the lower house were reserved for the ruling party and its allies. Even after the total victory of Solidarity in the June elections, Jeruzelski, the president and the head of state, attempted to install a communist prime minister. Only further threat of popular protest and the defection of the regime's allies forced the regime to submit to a non-communist prime minister.

The communist regime in Czechoslovakia vigorously resisted political reforms. Authorities repeatedly refused negotiations with the opposition, deploying security forces to contain frequent demonstrations. Finally, widespread, massive, prolonged demonstrations and strikes forced the regime to give in to the opposition's demands for democratization. In Stokes's words (1993), it was "massive gatherings of hundreds of thousands of citizens on an almost daily basis" that "pushed the Communists aside" in Czechoslovakia.

TABLE 4  
Age Ratios in Eastern Europe in the late 1980s

Country	(15 to 29)/(30 to 64)	(20 to 29)/(30 to 64)
Hungary	0.43	0.27
Bulgaria	0.45	0.29
Czechoslovakia	0.49	0.31
Poland	0.49	0.32
Romania	0.52	0.33

Shown are the ratios of the young to the old population for East European communist countries in the late 1980s. The numbers are the average of years 1988, 1989, and 1990.

The Romanian regime never fully conceded. Ceaușescu was only willing to respond with repression, threatening to create another Tienanmen Square. The result was a bloody revolution. Even after Ceaușescu’s execution, the new regime, which mostly consisted of communists, was not open to democracy. The National Salvation Front that took charge after the revolution committed election fraud and granted only limited political liberties.

This brief overview suggests that, ranking from the most accommodating response to the most repressive response, Hungary ranks first, followed by Bulgaria, Poland, Czechoslovakia, and Romania. There are some reservations as to whether Poland should be ranked more repressive than Czechoslovakia: There were more popular protests in Czechoslovakia, however in Poland, the regime did not fully democratize, reserving a majority of the seats in the Sejm for the ruling party. This ranking is consistent with White’s (2001) categorization of the 1989 revolutions. He argues that transitions in Hungary and Bulgaria were “transitions from above” and those of Poland, Czechoslovakia, and Romania were “transitions from below.” In the former group, regimes initiated reforms, while in the latter, they were overthrown by popular protests. White’s categorization is an alternative way to capture the tendency of these regimes toward taking repressive or accommodating responses to popular pressure.

Table 4 shows the average of the ratio of the young to the old in these countries for the

three contentious years of 1988, 1989, and 1990. We use two measures: the ratio of population between 15 and 29 to those between 30 and 64, and the ratio of population between 20 to 29 to those between 30 and 64. By both measures, Hungary had the oldest population, followed by Bulgaria, Czechoslovakia and Poland, and Romania. This is the same pattern that emerged from our analysis of state response to dissent in these countries in the late 1980s: the younger is the population, the *higher* is the likelihood of repression.

## VI CONCLUSION

We develop a simple model to analyze the effects of age structure on state response to dissent. Both the young and the old pay the costs of attempting to change the status quo. However, the young benefit from a successful revolution for a longer period of time, and hence have more incentive to revolt. As the population grows younger, the potential for social unrest increases. However, whether this leads to reform or repression depends on state response to the increase in the threat of revolution. We show that state response hinges on whether the state can discriminately target repression or concession. Remarkably, when the state can target repression, but not concession, the likelihood of repression *decreases* as the proportion of more radical group increases—as the population grows younger. In contrast, when the state can target concession, but not repression, the likelihood of repression *increases*.

In the real world, states use a combination of imperfectly targeted repression and concession policies. Our key step in bringing the model to the data is that some institutions facilitate targeted repression, while others facilitate targeted concession. Drawing on the literature on dictatorships, we argue that state parties provide the infrastructure that facilitate targeted concessions, while the institutional settings of military regimes facilitate targeted repression. Therefore, military regimes without state parties closely represent regimes that can target repression, but not concession. In contrast, non-military single-party regimes closely represent regimes that can target concession, but not repression. Thus, two empirical hypotheses emerge: (1) In military regimes without a party structure, the younger the popu-

lation is, the *lower* the likelihood of repression; and (2) in non-military single-party regimes, the younger the population, the *higher* the likelihood of repression.

We test these hypotheses by combining regime-type data from Cheibub et al. (2010) and Geddes et al. (2014) and using three different measures of repression: the CIRI Physical Integrity Rights Index (Cingranelli et al. 2014), the Political Terror Scales (Gibney et al. 2014), and the Freedom House Civil Liberties index. To further underscore the relevance of our theoretical results for the real world, we apply the model to explain the variations in state response to dissent in East European communist regimes in the late 1980s. We provide an original case study that ranks state response in these regimes in the late 1980s from most repressive to most accommodating. We show that, in countries with younger populations, states resisted reforms and democratization more forcefully and used more repressive measures against the dissidents.

We end by highlighting that our model can be extended to settings in which citizens are divided along other characteristics such as religion and ethnicity as long as the resulting groups have similar demands, and one group is more radical than the other. In such settings, too, as the size of the more radical group increases, states that can target repression, but cannot target concession, are less likely to use repression.

## APPENDIX

**Proof of Proposition 1:** Let  $V^{an}(R)$ ,  $a \in \{y, o\}$ , be the group  $a$  non-elite's expected payoff from revolt, and let  $V^{an}(\neg R; T)$  be their expected payoff from no revolt given the state's redistribution strategy  $T$ . Then,

$$\begin{aligned} V^{on}(R) &= (1 - \mu)2y, & V^{on}(\neg R; T) &= \gamma^y((1 - \mu)2y) + (1 - \gamma^y)((1 - \theta)2y + T^o), \\ V^{yn}(R) &= (1 - \mu)2y + \beta 2y = (1 + \beta - \mu)2y, \end{aligned}$$

$$\begin{aligned}
V^{yn}(\neg R; T) &= \gamma^o \{(1 - \mu)2y + \beta 2y\} \\
&\quad + (1 - \gamma^o) \{(1 - \theta)2y + T^y + \beta [\gamma^o(1 - \mu)2y + (1 - \gamma^o)((1 - \theta)2y + T^o)]\} \\
&= \gamma^o(1 + \beta)(1 - \mu)2y + (1 - \gamma^o)((1 + \beta)(1 - \theta)2y + T^y + \beta T^o). \tag{5}
\end{aligned}$$

Each group revolt if and only if their expected payoff from revolt exceeds that of no revolt, i.e.,  $\gamma^a(T) = 1$  if and only if  $V^{an}(R) > V^{an}(\neg R; T)$ . Because we focus on weakly-undominated strategies, the payoffs in (5) are simplified to:

$$\begin{aligned}
V^{on}(R) &= (1 - \mu)2y, & V^{on}(\neg R; T) &= (1 - \theta)2y + T^o, \\
V^{yn}(R) &= (1 + \beta - \mu)2y, & V^{yn}(\neg R; T) &= (1 + \beta)(1 - \theta)2y + T^y + \beta T^o.
\end{aligned}$$

Thus, the old revolt if and only if  $(1 - \mu)2y > (1 - \theta)2y + T^o$ , and the young revolt if and only if  $(1 + \beta - \mu)2y > (1 + \beta)(1 - \theta)2y + T^y + \beta T^o$ . Rearranging yields the results.  $\square$

**Proof of Proposition 3:** If  $\theta \leq \mu < (1 + \beta)\theta$ , from Corollary 1, only the young revolt under the status quo. In equilibrium, the state chooses between: (1) repress all the non-elite and do not redistribute, i.e.,  $s = 1$  and  $T = (0, 0)$ ; and (2) redistribute at a level,  $\bar{T}$ , just enough to neutralize the young, i.e.,  $s = 0$  and  $T = \bar{T} = (\bar{T}^y, \bar{T}^o)$ .  $\bar{T}$  is the transfer that makes the young indifferent between revolt and no revolt, i.e.,  $V^{yn}(R) = V^{yn}(\bar{T})$ , that is,  $(1 + \beta - \mu)2y = y^n + \bar{T}^y + \beta(y^n + \bar{T}^o)$ , which is simplified to

$$((1 + \beta)\theta - \mu) 2y = \bar{T}^y + \beta \bar{T}^o. \tag{6}$$

Because  $\beta < 1$ ,  $\bar{T}^o = 0$ . Thus, from equation (6),

$$\bar{T}^y = ((1 + \beta)\theta - \mu) 2y. \tag{7}$$

Hence, the optimization of the state is simplified to

$$\hat{\sigma}^e = \arg \max_{s, T} (1 - \omega(1)) y^e - r_y T^y - r_o T^o \quad \text{s.t.} \quad (s, T) \in \{(0, (\bar{T}^y, 0)), (1, (0, 0))\}.$$

Moreover,  $V^e(0, (\bar{T}^y, 0)) < V^e(1, (0, 0))$  if and only if  $y^e - r_y \bar{T}^y < (1 - \omega(1))y^e$ . Substituting from equation (7) and rearranging, this inequality is equivalent to  $\omega(1) < \frac{r_y}{\theta} ((1 + \beta)\theta - \mu)$ .

Define  $\bar{\omega}^y \equiv \frac{r_y}{\theta} ((1 + \beta)\theta - \mu)$ . Then,

$$\hat{\sigma}^e = \begin{cases} (1, (0, 0)) & ; \omega < \bar{\omega}^y \\ (0, (\tilde{T}^y, 0)) & ; otherwise \end{cases}$$

If  $\mu < \theta$ , from Corollary 1, both the young and the old revolt under the status quo. In equilibrium, the state chooses between: (1) repress all the non-elite and do not redistribute, i.e.,  $s = 1$  and  $T = (0, 0)$ ; (2) do not repress, i.e.,  $s = 0$ , and redistribute to the young and to the old at minimum levels that neutralize both groups, i.e.,  $T = (\tilde{T}^y, \tilde{T}^o)$ . Clearly,  $\tilde{T}^o$  is derived by setting  $\beta = 0$  in equation (2)

$$\tilde{T}^o = (\theta - \mu)2y. \quad (8)$$

From equation (6),  $\tilde{T}^y + \beta\tilde{T}^o = ((1 + \beta)\theta - \mu) 2y$ , thus,

$$\tilde{T}^y = ((1 + \beta)\theta - \mu) 2y - \beta(\theta - \mu)2y = (\theta - (1 - \beta)\mu)2y. \quad (9)$$

Therefore, the optimization problem of the state is simplified to

$$\hat{\sigma}^e = \arg \max_{s, T} V^e(s, (T^y, T^o)), \quad \text{s.t.} \quad (s, T) \in \{(0, (\tilde{T}^y, \tilde{T}^o)), (1, (0, 0))\}.$$

$V^e(1, (0, 0)) > V^e(0, (\tilde{T}^y, \tilde{T}^o))$  if and only if  $(1 - \omega(1))y^e < y^e - r_y\tilde{T}^y - r_o\tilde{T}^o$ . Substituting from equations (8) and (9) and rearranging, this inequality is equivalent to  $1 - \frac{\mu}{\theta}(1 - r_y\beta) < \tilde{\omega}$ , where  $\tilde{\omega}$  is defined as  $\tilde{\omega} \equiv 1 - \frac{\mu}{\theta}(1 - r_y\beta)$ . Thus,

$$\hat{\sigma}^e = \begin{cases} (1, (0, 0)) & ; \omega(1) < \tilde{\omega} \\ (0, (\tilde{T}^y, \tilde{T}^o)) & ; otherwise \quad \square \end{cases}$$

**Proof of Proposition 4:** Define  $r = s^y r_y + s^o r_o$ . The optimization problem of the state is

$$\hat{\sigma}^e = \arg \max_{s, T} (1 - \omega(r)) y^e - T \quad \text{s.t.} \quad \text{no revolution.}$$

If  $\theta \leq \mu < (1 + \beta)\theta$ , from Corollary 1, the young revolt under the status quo, but the old do not. Because repression is costly the state does not repress the old. Thus, the optimization problem of the state is analogous to the one discussed in Proposition 2.

If  $\mu < \theta$ , from Corollary 1, both the young and the old revolt under the status quo. Setting  $\beta = 0$  in equation (2) delivers the minimum transfer, denoted by  $\hat{T}^o$ , that satisfies the old:

$$\hat{T}^o \equiv (\theta - \mu)2y. \quad (10)$$

The minimum transfer that neutralizes the young is  $\hat{T}_u$  that was derived in equation (2).

In equilibrium, the state chooses between: (1) repress all the non-elite and do not redistribute, i.e.,  $s = (1, 1)$  and  $T = 0$ ; (2) repress the young and redistribute just enough to neutralize the old, i.e.,  $s = (1, 0)$  and  $T = \hat{T}^o$ ; and (3) Redistribute just enough to neutralize the young, i.e.,  $s = (0, 0)$  and  $T = \hat{T}_u$ , which is also enough to neutralize the old because  $\hat{T}_u > \hat{T}^o$  as is clear from a comparison of equations (2) and (10). Therefore, the optimization problem of the state is simplified to

$$\hat{\sigma}^e = \arg \max_{s, T} V^e(s, T) \quad \text{s.t.} \quad (s, T) \in \{((1, 1), 0), ((1, 0), \hat{T}^o), ((0, 0), \hat{T}_u)\}.$$

Next, we compare the payoffs to the state from these three policies. (1) and (2):  $V^e((1, 0), \hat{T}^o) < V^e((1, 1), 0)$  if and only if  $(1 - \omega(r_y))y^e - \hat{T}^o < (1 - \omega(1))y^e$ . Substituting from equation (10) and rearranging, this inequality is equivalent to

$$\omega(1) - \omega(r_y) < 1 - \frac{\mu}{\theta}. \quad (11)$$

(1) and (3):  $V^e((0, 0), \hat{T}_u) < V^e((1, 1), 0)$  if and only if  $y^e - \hat{T}_u < (1 - \omega(1))y^e$ . Substituting from equation (2) and rearranging, this inequality is equivalent to

$$\omega(1) < 1 - \frac{\mu}{(1 + \beta)\theta} = \hat{\omega}_u. \quad (\text{from equation (4)}) \quad (12)$$

(2) and (3):  $V^e((0, 0), \hat{T}_u) < V^e((1, 0), \hat{T}^o)$  if and only if  $y^e - \hat{T}_u < (1 - \omega(r_y))y^e - \hat{T}^o$ . Substituting from equations (2) and (10) and rearranging, this inequality is equivalent to

$$\omega(r_y) \leq \frac{\mu}{\theta} \frac{\beta}{1 + \beta}. \quad (13)$$

Define  $\hat{\omega}^y \equiv \frac{\mu}{\theta} \frac{\beta}{1 + \beta}$  and  $\hat{\omega}^o \equiv 1 - \frac{\mu}{\theta}$ . Then, from inequalities (11), (12), and (13),

$$\hat{\sigma}^e = \begin{cases} ((1, 1), 0) & ; \omega(1) < \hat{\omega} \text{ and } \omega(1) - \omega(r_y) < \hat{\omega}^o \\ ((0, 0), \hat{T}_u) & ; \omega(1) \geq \hat{\omega} \text{ and } \omega(r_y) \geq \hat{\omega}^y \\ ((1, 0), \hat{T}^o) & ; \textit{otherwise}. \quad \square \end{cases}$$



**Proof of Proposition 5:** Define  $I_1 \equiv [\theta, (1 + \beta)\theta]$ ,  $I_2 \equiv [0, \theta]$ . From Proposition 2,  $\hat{T}_u$  and  $\hat{\omega}_u$  are independent of  $r_y$ , and hence  $P_{uu}(r_y) = P_{uu}(r'_y)$ . Let  $P_{ut}(\text{rep}|\mu \in I_i)$  be the probability of repression conditional on  $\mu \in I_i$ ,  $i \in \{1, 2\}$ , under untargeted repression and targeted concession. From Proposition 3,

$$\begin{aligned}
P_{ut}(\text{rep}|\mu \in I_1) &= Pr(\omega < \bar{\omega}^y|\mu \in I_1) = Pr(\omega < \frac{r_y}{\theta}((1 + \beta)\theta - \mu)|\mu \in I_1) \\
&= \frac{Pr(\mu < (1 + \beta - \frac{\omega}{r_y})\theta, \mu \in I_1)}{Pr(\mu \in I_1)} = \frac{Pr(\theta \leq \mu < \min\{(1 + \beta - \frac{\omega}{r_y})\theta, (1 + \beta)\theta\})}{Pr(\mu \in I_1)} \\
&= \frac{Pr(\theta \leq \mu < (1 + \beta - \frac{\omega}{r_y})\theta)}{Pr(\mu \in I_1)}, \quad \text{and} \tag{14}
\end{aligned}$$

$$\begin{aligned}
P_{ut}(\text{rep}|\mu \in I_2) &= Pr(\omega < \tilde{\omega}|\mu \in I_2) = Pr(\omega < 1 - \frac{\mu}{\theta}(1 - r_y\beta)|\mu \in I_2) \\
&= Pr\left(\mu < \frac{1 - \omega}{1 - r_y\beta} \theta \middle| \mu \in I_2\right) = \frac{Pr(\mu < \frac{1 - \omega}{1 - r_y\beta} \theta, \mu \in I_2)}{Pr(\mu \in I_1)} \\
&= \frac{Pr(\mu < \theta \min\{\frac{1 - \omega}{1 - r_y\beta} \theta, \theta\})}{Pr(\mu \in I_2)}. \tag{15}
\end{aligned}$$

Thus, from equations (14), and (15),

$$\begin{aligned}
P_{ut} &= P_{ut}(\text{rep}|\mu \in I_1)Pr(\mu \in I_1) + P_{ut}(\text{rep}|\mu \in I_2)Pr(\mu \in I_2) \\
&= Pr\left(\theta \leq \mu < (1 + \beta - \frac{\omega}{r_y})\theta\right) + Pr\left(\mu < \theta \min\{\frac{1 - \omega}{1 - r_y\beta}, 1\}\right). \tag{16}
\end{aligned}$$

From equation (16),  $P_{ut}$  is increasing in  $r_y$ .

Similarly,  $P_{tu} = Pr_{tu}(\text{rep}|\mu \in I_1)Pr(\mu \in I_1) + Pr_{tu}(\text{rep}|\mu \in I_2)Pr(\mu \in I_2)$ . From Proposition 4,

$$\begin{aligned}
P_{tu}(\text{rep}|\mu \in I_1) &= Pr(\omega(r_y) < \hat{\omega}_u|\mu \in I_1) = Pr(\omega(r_y) < 1 - \frac{\mu}{(1 + \beta)\theta}|\mu \in I_1) \\
&= Pr(\mu < (1 + \beta)\theta(1 - \omega(r_y))|\mu \in I_1) = \frac{Pr(\mu < (1 + \beta)\theta(1 - \omega(r_y)), \mu \in I_1)}{Pr(\mu \in I_1)} \\
&= \frac{Pr(\theta \leq \mu < \min\{(1 + \beta)\theta(1 - \omega(r_y)), (1 + \beta)\theta\})}{Pr(\mu \in I_1)} \\
&= \frac{Pr(\theta \leq \mu < (1 + \beta)\theta(1 - \omega(r_y)))}{Pr(\mu \in I_1)}, \quad \text{and} \tag{17}
\end{aligned}$$

$$\begin{aligned}
P_{tu}(\text{rep}|\mu \in I_2) &= 1 - Pr(\omega(1) \geq \hat{\omega}, \omega(r_y) \geq \hat{\omega}^y | \mu \in I_2) \\
&= 1 - Pr\left(\omega(1) \geq 1 - \frac{\mu}{(1+\beta)\theta}, \omega(r_y) \geq \frac{\mu}{\theta} \frac{\beta}{1+\beta} \mid \mu \in I_2\right) \\
&= 1 - \frac{Pr(\mu \geq (1-\omega(1))(1+\beta)\theta, \mu \leq \frac{1+\beta}{\beta}\theta\omega(r_y), \mu \in I_2)}{Pr(\mu \in I_2)} \\
&= 1 - \frac{Pr((1-\omega(1))(1+\beta)\theta \leq \mu \leq \min\{\frac{1+\beta}{\beta}\theta\omega(r_y), \theta\})}{Pr(\mu \in I_2)}. \tag{18}
\end{aligned}$$

From equations (17) and (18),  $P_{tu}(\text{rep}|\mu \in I_1)$  and  $P_{tu}(\text{rep}|\mu \in I_2)$  are decreasing in  $r_y$ . Thus, the unconditional probability of repression,  $P_{tu}$ , is also decreasing in  $r_y$ .  $\square$

## REFERENCES

- Abrahamian, Ervand. 1982. *Iran between Two Revolutions*. Princeton, NJ: Princeton University Press.
- Acemoglu, Daron and James Robinson. 2001. "A Theory of Political Transition." *American Economic Review* 91: 938-63.
- Acemoglu, Daron and James Robinson. 2006. *Economic Origins of Dictatorship and Democracy*. New York: Cambridge University Press.
- Acemoglu, Daron, Davide Ticchi, and Andrea Vindigni. 2010. "A Theory of Military Dictatorships." *American Economic Journal: Macroeconomics* 2: 1-42.
- Besley, Timothy, and Torsten Persson. 2011. "The Logic of Political Violence." *Quarterly Journal of Economics* 126: 1411-45.
- Boix, Charles. 2003. *Redistribution and Democracy*. New York: Cambridge University Press.
- Boix, Charles, and Milan Svoblik. 2013. "The Foundations of Limited Authoritarian Government: Institutions and Power-Sharing in Dictatorships." *Journal of Politics* 75: 300-16.
- Brunborg, Helge, Ewa Tabeau, and Henrik Urdal, eds. 2006. *The Demography of Armed Conflict*. Berlin: Springer.
- Buechler, Steven M. 2004. "The Strange Career of Strain and Breakdown Theories of Collective Action." In *The Blackwell Companion to Social Movements*. Ed. by David A. Snow, Sarah A. Soule, and Hanspeter Kriesi. Malden, MA: Blackwell Publishing Ltd.
- Bueno de Mesquita, Ethan. 2010. "Regime Change and Revolutionary Entrepreneurs." *American Political Science Review* 104: 446-66.
- Buenrostro, Lucia, Amrita Dhillon, and Myrna Wooders. 2007. "Protests and Reputation." *International Journal of Game Theory* 35: 353-77.
- Chamley, Christophe. 1999. "Coordinating Regime Switches." *Quarterly Journal of Economics* 114: 869-905.

- Casper, Brett, and Scott Tyson. 2014. "Popular Protest and Elite Coordination in a Coup d'état." *Journal of Politics* 76: 548-64.
- Cheibub, Jose A., Jennifer Gandhi, and James R. Vreeland. 2010. "Democracy and Dictatorship Revisited." *Public Choice* 143: 67-101.
- Chen, Heng, Yang K. Lu, and Wing Suen. 2014. "The Power of Whispers: A Theory of Rumor, Communication and Revolution." *International Economic Review*. Forthcoming.
- Chen, Jidong, and Yiqing Xu. 2014. "On Deliberative Authoritarian Governance." Mimeo.
- Choucri, Nazli. 1984. *Multidisciplinary Perspectives on Population and Conflict*. Syracuse, NY: Syracuse University Press.
- Cingranelli, David L., David L. Richards, and K. Chad Clay. 2014. *The CIRI Human Rights Dataset Version 2014.04.14*. <http://www.humanrightsdata.com>
- Collier, Ruth B. 1982. *Regimes in Tropical Africa: Changing Forms of Supremacy, 1945-1975*. Los Angeles and Berkeley: University of California Press.
- Collier, Paul. 2000. "Doing Well Out of War: An Economic Perspective." In *Greed and Grievance: Economic Agendas in Civil Wars* ed. by Mats Berdal and David M. Malone. Boulder, CO: Lynne Rienner.
- Conrad Courtenay R., and Will H. Moore. 2010. "What Stops the Torture?" *American Journal of Political Science* 54: 459-76.
- Davenport, Christian. 2007. "State Repression and Political Order." *Annual Review of Political Science*, 10: 1-23.
- DeNardo, James. 1985. *Power in Numbers: The Political Strategy of Protest and Rebellion*. Princeton, NJ: Princeton University Press.
- Dunning, Thad. 2008. *Crude Democracy: Natural Resource Wealth and Political Regimes*. New York, NY: Cambridge University Press.
- Edmond, Chris. 2013. "Information Manipulation, Coordination and Regime Change." *Review of Economic Studies* 80: 1422-58.
- Egorov, Georgy, Sergei Guriev, and Konstantin Sonin. 2009. "Why Resource-poor Dictators Allow Freer Media: A Theory and Evidence from Panel Data." *American Political Science Review* 103: 645-68.
- Ellis, Christopher J., and John Fender. 2011. "Information Cascades and Revolutionary Regime Transitions." *Economic Journal* 121: 763-92.
- Ellis, Christopher J., and John Fender. 2014. "Public Sector Capital and the Transition from Dictatorship to Democracy." *The Manchester School* 82: 322-46.
- Epstein, David, Bahar Leventoglu, and Sharyn O'Halloran. 2012. "Minorities and Democratization." *Economics and Politics* 24: 259-78.
- Fardust, Hussein. 1999. *The Rise and Fall of Pahlavi Dynasty: Memoirs of Former General Hussein Fardust*. trans. by Ali Akbar Dareini. India: Motilal Banarsidass.
- Fearon, James. 2011. "Self-enforcing Democracy." *Quarterly Journal of Economics* 126: 1661-1708.

- Freedom House. 2014. *Freedom in the World 2014* Washington, D.C. www.freedomhouse.org
- Gandhi, Jennifer. 2008. *Political Institutions Under Dictatorship*. New York: Cambridge University Press.
- Gandhi, Jennifer and Adam Przeworski. 2006. "Cooperation, Cooptation, and Rebellion Under Dictatorships." *Economics and Politics*, 18: 1-26.
- Geddes, Barbara. 2007. "Why Parties Are Created after Authoritarian Seizures of Power?" Paper presented at APSA annual meeting, Chicago, IL, Aug 30, 2007.
- Geddes, Barbara, Joseph Wright, and Erica Frantz. 2014. "Autocratic Breakdown and Regime Transitions: A New Data Set." *Perspectives on Politics* 12: 313-31.
- George, Lisa, and Joel Waldfogel. 2003. "Who Affects Whom in Daily Newspaper Markets?" *Journal of Political Economy* 111: 765-84.
- Ghosn, Faten, Glenn Palmer, and Stuart Bremer. 2004. "The MID3 Data Set, 1993-2001: Procedures, Coding Rules, and Description." *Conflict Management and Peace Science* 21: 133-54.
- Gibney, Mark, Linda Cornett, Reed Wood, & Peter Haschke. 2014. The Political Terror Scales 1976-2014. <http://www.politicalterroryscale.org>.
- Ginkel, John, and Alastair Smith. 1999. "So You Say You Want a Revolution: A Game Theoretic Explanation of Revolution in Repressive Regimes." *Journal of Conflict Resolution* 43: 291-316.
- Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Havard Strand. 2002. "Armed Conflict 1946-2001: A New Dataset." *Journal of Peace Research* 39: 615-37.
- Goldstone, Jack A. 1991. *Revolution and Rebellion in the Early Modern World*. University of California Press.
- Goldstone, Jack A. 2001. "Demography, Environment, and Security." In *Environmental Conflict*, ed. by Paul F. Diehl and Nils P. Gleditsch, 84-108. Boulder, CO: Westview.
- Goodwin, Jeff. 2001. *No Other Way Out: States and Revolutionary Movements, 1945-1991*. New York, NY: Cambridge University Press.
- Gurr, Ted R. 1970. *Why Men Rebel?* Princeton, NJ: Princeton University Press.
- Gurr, Ted Robert. 1986. "The Political Origins of State Violence and Terror: A Theoretical Analysis." In *Government Violence and Repression*, ed. Michael Stohl and George A. Lopez. New York, NY: Greenwood Press pp. 45-72.
- Haschke, Peter. 2014. *Democracy and the Human Right to the Physical Integrity of the Person* (Unpublished doctoral dissertation). University of Rochester, Rochester, NY.
- Henderson, Conway W. 1991. "Conditions Affecting the Use of Political Repression." *Journal of Conflict Resolution* 35: 120-42.
- Henderson, Conway W. 1993. "Population Pressure and Political Repression." *Social Science Quarterly*, 74: 322-33.
- Heston, Alan, Robert Summers, and Bettina Aten. 2012. "Penn World Table Version 7.1" Center for International Comparisons of Production, Income and Prices at UPenn.

- Hollyer, James R., Peter B. Rosendorff, and James R. Vreeland. 2015. "Transparency, Protest and Political (In)Stability." *Forthcoming in American Political Science Review*.
- Lane, David. 1975. *The Roots of Russian Communism: A Social and Historical Study of Russian Social-Democracy 1898-1907*. University Park, PA: Penn State Univ. Press.
- Leventoglu, Bahar. 2005. "Social Mobility and Political Transitions." *Journal of Theoretical Politics* 17: 465-96.
- Linz, Juan J. 2000. *Totalitarian and Authoritarian Regimes*. Boulder, CO: Lynne Rienner.
- Lipset, Seymour M. 1971. "Youth and Politics." In *Contemporary Social Problems*, ed. by Robert K. Merton and Robert Nisbet. Harcourt Brace Jovanovich, INC.
- Lipset, Seymour M. and G. M. Schaflander. 1971. *Passion and Politics: Student Activism in America*. Boston: Little Brown and Company.
- Lohmann, Susanne. 1994. "The Dynamics of Informational Cascades: The Monday Demonstrations in Leipzig, East Germany 1989/91." *World Politics* 47: 42-101.
- Lust-Okar, Ellen. 2006. "Elections under Authoritarianism: Preliminary Lessons from Jordan." *Democratization* 13: 456-71.
- MacCulloch, Robert Jack. 2005. "Income Inequality and the Taste for Revolution." *Journal of Law and Economics* 48: 93-123.
- Magaloni, Beatriz, and Ruth Kricheli. 2010. "Political Order and One-Party Rule." *Annual Review of Political Science* 13: 123-43.
- Marshall, Monty G. 2013. *POLITY IV PROJECT: Political Regime Characteristics and Transitions, 1800-2013: Dataset Users Manual*. Polity IV dataset version 2013 ed. Polity IV Project: Center for Systemic Peace.
- Meirowitz, Adam, and Joshua Tucker. 2013. "People Power or a One-Shot Deal? A Dynamic Model of Protest." *American Journal of Political Science* 57: 478-90.
- Milani, Abbas. 2011. *The Shah*. New York: Palgrave MacMillan.
- Mitchell Neil J. and James M. McCormick. 1988. "Economic and Political Explanations of Human Rights Violations." *World Politics* 40: 476-98.
- Nordås, Ragnhild, and Christian Davenport. 2013. "Fight the Youth: Youth Bulges and State Repression." *American Journal of Political Science* 57: 926-40.
- Parsa, Misagh. 2000. *States, Ideologies, & Social Revolutions: A Comparative Study of Iran, Nicaragua, and the Philippines*. Cambridge, UK: Cambridge University Press.
- Persson, Torsten, and Guido Tabellini. 2009. "Democratic Capital: The Nexus of Political and Economic Change." *American Economic Journal: Macroeconomics* 1: 88-126.
- Philip, George. 1985. *The Military in South American Politics*. Croom Helm, Ltd.
- Pilbeam, Pamela. 1991. *The 1830 Revolution in France*. London, UK: The MacMillan Press.
- Poe, Steven C., and C. Neal Tate. 1994. "Repression of Human Rights to Personal Integrity in the 1980s: A Global Analysis." *American Political Science Review* 88: 853-72.
- Poe, Steven C., Nicholas Rost, and Sabine C. Carey. 2006. "Assessing Risk and Opportunity in Conflict Studies: A Human Rights Analysis." *Journal of Conflict Resolution* 50: 484-507.

- Sarkees, Meredith Reid, and Frank Wayman. 2010. *Resort to War: 1816-2007*. CQ Press.
- Shadmehr, Mehdi. 2014. "Mobilization, Repression, and Revolution: Grievances and Opportunities in Contentious Politics." *Journal of Politics* 76: 621-35.
- Shadmehr, Mehdi. 2015. "Extremism in Revolutionary Movements." *Forthcoming in Games and Economic Behavior*.
- Shadmehr, Mehdi, and Dan Bernhardt. 2011. "Collective Action with Uncertain Payoffs: Coordination, Public Signals, and Punishment Dilemmas." *American Political Science Review* 105: 829-51.
- Skocpol, Theda. 1979. *States and Social Revolutions: A Comparative Analysis of France, Russia, and China*. New York: Cambridge University Press.
- Stokes, Gale. 1993. *The Walls Came Tumbling Down: The Collapse of Communism in Eastern Europe*. New York: Oxford University Press.
- Svolik, Milan. 2013. "Contracting on Violence: Authoritarian Repression and Military Intervention in Politics." *Journal of Conflict Resolution* 57: 765-94.
- Tarrow, Sidney. 1998. *Power in Movement: Social Movement and Contentious Politics*. Cambridge, UK: Cambridge University Press.
- Tilly, Charles. 1978. *From Mobilization to Revolution*. MA: Addison-Wesley.
- Tilly, Charles. 2004. *Social Movements: 1768-2004*. Boulder, CO: Paradigm Publishers.
- Tyson, Scott, and Alastair Smith. 2013. "Two-Sided Coordination: Competition in Collective Action." Mimeo.
- United Nations, The Population Division, Department of Economic and Social Affairs. 2013. *World Population Prospects: The 2012 Revision*. New York: United Nations.
- Urdal, Henrik. 2004. "The Devil in the Demographics: The Effect of Youth Bulges on Domestic Armed Conflict, 1950-2000." Social Development Papers. Washington, DC: Conflict Prevention and Reconstruction Unit, World Bank.
- Urdal, Henrik. 2006. "A Clash of Generations? Youth Bulges and Political Violence." *International Studies Quarterly* 50: 607-629.
- US State Department. 1988-1990. *Country Reports on Human Rights Practices for 1987*. Washington D.C.: US Government Printing Office.
- Vreeland, James Raymond. 2008. "Political Institutions and Human Rights: Why Dictatorships Enter into the United Nations Convention Against Torture." *International Organization* 62: 65-101.
- Waldfogel, Joel. 2003. "Preference Externalities: An Empirical Study of Who Benefits Whom in Differentiated Product Markets." *RAND Journal of Economics* 34: 557-68.
- White, Stephen. 2001. *Communism and its Collapse*. New York: Routledge.
- Wilkinson, Steven I. 2009. "Riots." *Annual Review of Political Science* 12: 329-43.
- Wintrobe, Ronald. 1998. *The Political Economy of Dictatorship*. Cambridge, MA: Cambridge University Press.
- Wooldridge, Jeffery. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cam-

bridge, MA: The MIT Press.