Discrimination, Repression and the Index of Human Rights in an Autocracy

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Abstract

We present a model of national security where an autocrat is engaged in a war with an insurgency. The population is comprised of a majority and a minority. Members of each group may participate in the insurgency and receive a payoff (which is private information). The government receives imperfect signals about whether or not a citizen is an insurgent. Since the signals are imperfect, a fraction of non-insurgents from each group is arrested. In this context, we find that the autocrat is more repressive towards the minority even when the insurgency is comprised of a larger fraction of the majority provided the majority is sufficiently large. Further, we find that a rise in inequality increases the probability of an arrest only for the minority. We also find that the autocrat is willing to arrest a greater number of citizens following a rise in inequality. A rise in inequality may increase (decrease) the size of the insurgency and decrease (increase) the probability that the autocracy remains in power if the minimum return from participating in the insurgency is greater (lesser) than a certain threshold. Similar results are obtained for index of human rights violations. Finally, we show that imposing fairness standards is not in the interest of the autocrat.

KEY WORDS: Repression; Human Rights; Discrimination; Inequality.

JEL Classification: H56; J15; D63; D74.

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1 Introduction:

Insurgencies are often comprised of a significantly high proportion of the marginalized population of a society which may result from disputes about distributive issues, rights to a territory, ongoing repression of the minority population by an elected or an authoritarian government, denial of political or cultural identity, denial of the right to self-determination and governance etc. Further, the demarcation among the majority and the minority population may be along religious lines or in terms of ethnic and cultural identities, caste, economic and political access and so on. Examples include the Houthi rebel insurgency in Yemen primarily formed of Zaidi Shia muslims, a minority, who have been fighting for control of territory with the authoritarian president Mr. Ali Abdullah Saleh prior to 2011 and against his successor Mr. Abdrabbuh Mansour Hadi since then. Similar conflicts for cultural, political identities and the rights to self-determination have been going on for decades in Kashmir and the north-east states of India which remain under the occupation of Indian armed forces with provision of the Armed Forces Special Powers Act (AFSPA), Maoist-Naxalite insurgency in India, Basque separatist in Spain, the Iraqi insurgency since 2017, the PKK in Turkey, the Baloch insurgency against the government of Pakistan to name a few in the past and present. Further, in many such societies, public opinion may often be divided about the legitimacy of the insurgency. The government's response, following any act of civil unrest or acts of dissension, is to delegitimize the insurgents and brand them as terrorists whenever possible and to clamp down on civic liberties which often exacerbates the degree of human rights violations. Moreover, such repression may often be targeted towards some specific groups more than others and may often target innocent members of the society wrongfully. The objective of the paper is to highlight how repression and discrimination maybe interwoven in any discourse on counter-insurgency. In this context, we analyze how the worsening of economic and/or political inequality affects the instruments with which the state tries to quell the insurgency, namely, repression and the human rights violations that ensue. Further, the paper also investigates whether or not the state in its effort to quell the insurgency resorts to being more repressive towards one group over another especially in the wake of worsening inequality.

To that end, we analyze a model where a country or a state is comprised of a majority and a minority population. For the purpose of this analysis, it suffices if the majority and the minority have unequal economic and political realities regardless of the actual reasons those inequalities may stem from. Members from each group may participate in an insurgency and become a rebel. Any one not taking part in the insurgency remains a loyalist. The government is autocratic and derives a utility by staying in power, i.e., by defeating the insurgency. The government is assumed to receive some intelligence about the rebels, however, the intelligence is not perfect. In this context, we consider two scenarios of imperfect intelligence. One where a rebel may send a signal that they are loyalists (*missed alarm*) and the other where a loyalist may send a signal that he/she is a rebel (*false alarm*) with some probability. Further, we assume that under *missed alarm*, a loyalist does not send a signal that he/she is a rebel. Similarly, under a *false alarm* a rebel does not send a signal that he/she is a loyalists. Since the intelligence is imperfect, the government may end up arresting some loyalists in order to defeat the insurgency. This results in human rights violations. Further, the probability of arrest may also differ across groups which brings the notion of discrimination to the fore. Members from each group receive a return (which is private information but from a known probability distribution) from participating in the insurgency provided he/she is not arrested. If he/she is arrested then her payoff is zero. A loyalist, on the other hand, receives some utility from being a loyal citizen if not wrongfully arrested. We will assume that the return from being a loyalist is different across two groups but is identical within the group. Finally, the autocratic government and the insurgency engage in a contest. If the insurgency defeats the government, the autocracy is dissolved. However, if the autocratic government wins, the insurgency is dissolved. In this setting, we analyze the effect of an increase in political/economic inequality on a) the weight attached by the autocrat on human rights violations b) the total fraction of citizens the autocrat is willing to arrest given that they appear to be loyalists c) the effect of rising inequality on the probability of arrests for the minority and the majority d) the size of the insurgency e) the probability of quelling the insurgency following a rise in inequality e) the index of human rights violations and finally f) the effect of imposing fairness standards on the probability of defeating the insurgency.[1] Although we analyze two types of intelligence failures, we only present the case for *missed alarm*. The results are qualitatively similar in the case of *false alarm*.[2] Our main findings under *missed alarm* can be summarized as follows:

a. *Among citizens who send the signal that they are loyal, the probability of incarceration is biased against members of the minority and favorably towards the majority even when a larger fraction of the majority may be engaged in the insurgency provided that the majority is sufficiently large. Further, any rise in economic or political inequality further exacerbates this asymmetry against the members of the minority.*

b. *We find that the autocrat does not attach any importance to human rights violations and following any rise in political or economic inequality, the autocrat becomes more repressive in the sense that he/she is willing to arrest a greater fraction of the population who appear to be loyal.*

c. *A rise in inequality may increase or decrease the size of the insurgency depending on whether the return from being a rebel (for a member of the minority) is greater than or less than a certain threshold. As a consequence, it may increase or decrease the likelihood that the autocrat remains in power depending on whether the return from participating in the insurgency is greater or lesser than that threshold.*

[1] We use the terms political/economic inequality and inequality interchangeably.

[2] The only difference between the two types of faulty intelligence is that under *missed alarm* anyone who sends a signal that he/she is a rebel must be one and hence is arrested with certainty. Any change in political or economic inequality does not change the probability of an arrest for citizens who sends the signal that he/she is a rebel. However, since both rebels and loyalists may also send the signal that they are loyalists, citizens who signal that they are loyalists are arrested with some probability (but not with certainty). Therefore, our main focus, in this case, lies in analyzing the effect of political of economic inequality on the probability of arrests of citizens who send the signal that they are loyalists across each group and subsequently how any change in the probability of arrest alters the size of the insurgency, the probability of the autocrat staying in power, the index of human rights violations etc. Under false alarm, rebels do not signal that they are loyalists. Therefore, anyone who signals that he/she is a loyalist must be one and hence is never arrested. However, since both loyalists and rebels may send the signal that they are rebels they are arrested with some probability (but not with certainty). As a consequence, our main focus in the case of a *false alarm* lies in analyzing the effect of economic or political inequality on the probability of arrests for citizens who send the signal that they are rebels and how changes in the probability across each group affects the size of the insurgency, the index of human rights violations etc.

d. *A rise in inequality may increase or decrease human rights violations depending on whether the return from being a rebel (for a member of the minority) is greater or lesser than a certain threshold. Further, we also show that imposing fairness in the probability of being arrested is suboptimal from the perspective of the autocrat. As a result, the autocrat does not impose fairness standards.*

We situate our model in the context of the existing literature on the political economy of terrorism and repression and the literature on racial profiling in section 2. Since both types of intelligence failures result in qualitatively similar outcomes, we only lay out the setup of the model and the payoffs for the case for *missed alarm* in section 3. We analyze the equilibrium probability of arrests and the equilibrium choice of joining the insurgency under *missed alarm* and explore the effect of political/economic inequality in sections 4 and 5 respectively. Conclusions follow in section 6.

2 Related Literature

Our paper weaves through and combines elements from two separate strands of literature, namely, the literature on racial profiling and fairness and the literature on the political economy of counter-terrorism, insurgency and repression. There has a substantial body of work on the effect of repression on terrorism which often involves insurgencies. Bueno De Mesquita and Dickson (2007) explores conditions under which a terrorist organization attacks a government with the hope that its counter-terrorism policies will radicalize the population and thereby increase its support at the expense of a less radical faction. In the context of counter-terrorism, Dragu and Polborn (2014) analyzes the role of legal limits to executive power in limiting the threat from terrorism. They find that without any limits to executive power, the government can pursue counter-terrorism policies that cater to electoral incentives which can exacerbate security. In this context, having explicit limits to executive power can increase security for the electorate. In a similar vein, Dragu (2017) analyzes the effectiveness of repression on terrorism. He shows that governments often pursue sub-optimal counter-terrorism policies because of electoral pressures and the electorate's inability to observe the governments actions. A similar finding is reported in Bueno de Mesquita (2007). Several studies have looked at the effect of repression on terrorism empirically and have found that such strategies can often be counter-productive (Lake (2002), Wilkinson (2011), Benmelech et al. (2015), Daxecker and Hess (2013)). In a similar vein Bagchi and Paul (2020) analyze a model of counter-insurgency in the context of a democracy and show that the human rights violations occur mainly because of faulty intelligence received by the state about who is and is not an insurgent. They analyze two types of faulty intelligence, namely, missed and false alarm and determine the optimal standards of human rights violations. Further, they analyze the effect of lowering human rights standards and find that lowering human rights standards theoretically could go either way, i.e., may increase or decrease the probability of quelling the insurgency. They test this prediction using data on Armed Forces Special Powers Act (AFSPA) in India using magnitude of violence as an instrument and find empirical support that lowering human rights standards may be detrimental to the probability of quelling insurgencies.

There is also significant body of work in the context of racial profiling, fairness and the prevention of crime. Persico (2002) analyzes a model of policing where citizens from two groups may choose to engage in crime depending on their earnings and the probability of being audited. Police audits citizens but are constrained so that they do not audit both groups equally. He shows that fairness and the prevention of crime need not always involve a tradeoff. In this context, he derives conditions under which forcing the police to behave fairly to both types of constituents may bring about a reduction in crime. In a similar vein, Cotton and Li (2015) develop a model of racial profiling and screening in the context of centralized crime. A criminal enterprise may recruit members from different communities to carry illicit drugs through a certain checkpoint. They show that when the social costs of a crime are high, having fairness standards can actually increase the incidence of crime. In other words, law enforcement is most effective when they do not face any constraints on their ability to profile, i.e., screen different population groups with different probabilities. They conclude that eliminating the ability of law enforcement officers to profile is never optimal.

In this context, Knowles et al. (1999) develop a model of policing when the police have a greater propensity to search the vehicles of African-American motorists for illicit drugs than those of white motorists. They develop an empirical test that is designed to elicit whether disproportionate searches arise from racial bias or the police's objective to maximize the number of arrests. They apply their test to the vehicle search data from Maryland and find that the results of the test support the hypothesis that greater search may not be motivated by racial prejudice. In contrast to some of the papers discussed above, Durlauf (2005) develops a framework to assess the effectiveness of racial profiling as a tool for interdiction and crime prevention. He finds that the opportunity cost of giving up fairness in the pursuit of deterrence is substantially large compared to the benefits it confers especially when one considers the pervasiveness of social stigma.

Our paper contributes to the existing literature on the political economy of insurgency by exploring how repression can be discriminatory across groups and may be more severe against minorities. Further, the paper also contributes to the extant literature on racial profiling by highlighting the role of discrimination in the context of insurgencies and analyzing the effect on inequality. We achieve this by building on the theoretical model in Bagchi and Paul (2020) to interweave these two strands of literature. Like them, we also assume that the government receives faulty intelligence (in terms of noisy signals) about whether or not a given citizen is a rebel. However, unlike the models in racial profiling, we assume that the law enforcement may not discover whether or not a member of a certain group is an insurgent or not with certainty depending on the type of faulty signal. Specifically, two possible types of errors are considered; a) some loyalists may appear to be insurgents (*false alarm*) and b) some insurgents may appear to be loyalists (*missed alarm*). However, our analysis differs from Bagchi and Paul (2020) in a number of ways: First, we analyze a model of autocracy where the insurgency is comprised of members from two different communities or groups, namely, a minority and a majority where members from each group have different propensities to participate in the insurgency. In this context, we show that the autocrat is more repressive towards the minority regardless of the type of faulty intelligence and whether or not a greater fraction of the insurgency may be comprised of the majority and explore how a rise in inequality exacerbates this asymmetry. Second, we endogenize and analyze what happens to the total fraction of citizens the autocrat is willing to arrest conditional on the signal (under both types of faulty intelligence) following a rise in political/economic inequality. Third, we determine the effect of rising inequality on human rights violations. Fourth, we also explore the effect of rising economic or political inequality on the size of the insurgency and the probability with which the autocrat is able to quell the rebellion. Finally, we investigate whether imposing fairness standards is optimal from the standpoint of the autocrat. Thus our main contribution to the literature is to distill the interwoven nature of discrimination and repression in context of insurgencies and to explore how these factors may interplay with rising inequality. We lay out the model for *missed alarm* in the next section.

3 Model

We analyze a model of insurgency with an autocratic government and a population comprised of a minority (denoted by m) and a majority (denoted by M). Let μ_m and μ_M be the size of the minority and the majority respectively such that $\mu_m + \mu_M = 1$ (size of the population). Further, we assume that $\mu_M = t\mu_m$. Members from the minority and the majority decide to be part of an insurgency or not. The government and the insurgency devote resource to fight against each other. If the government wins then the insurgents are punished and the government receives a payoff $\tilde{U}$. However, if the government loses, then the insurgents assume power and the government is dissolved in which case the government receives a payoff of 0. We assume that the government does not observe whether a given citizen is a rebel or not. However, it receives noisy signals about the likelihood that a given member is a rebel. Let $s^i \in \{0, 1\}$ for $i \in \{m, M\}$ be a binary variable that takes the value 1 when the government receives an indication that the given member may be a rebel and takes the value 0 when the government receives no such indication. Further, let $\theta^i \in \{0,1\}$ for $i \in \{m, M\}$ be a binary variable that takes the value 1 when a member is a rebel and 0 otherwise. Since the signal is faulty, it is possible for the government to receive a signal that a member is a rebel when the said member is a loyalist i.e., the government may have a false alarm. Similarly, the government may also receive a signal that a member is a loyalist when he/she is actually a rebel, i.e., in this case the government misses an alarm. Let the joint probability distribution of (s^i, θ^i) be given by $\Pr[s^i = j, \theta^i = k] = \pi^i_{jk}$ for $i \in \{m, M\}$ for $j \in \{0,1\}$ and $k \in \{0,1\}$.

We will assume that the signals are noisy in the following ways: One in which the government does not receive a signal $s = 1$ from the loyalist, i.e., $\pi_{10} = 0$. In this case, a signal $s = 1$ only comes if a citizen belongs to the insurgency. However, a signal $s = 0$ may come from both a rebel or a loyalist (we call this case *missed alarm*). The second case arises when a signal $s = 0$ can come only from a loyalist. However, a signal $s = 1$ may come from both a rebel and a loyalist (we call this case *false alarm*). We layout the information about the joint probability distribution in the tables below.

s^i \ θ^i	0	1
0	π^i_{00}	π^i_{01}
1	0	π^i_{11}

Table 1: Missed Alarm

s^i \ θ^i	0	1
0	π^i_{00}	0
1	π^i_{10}	π^i_{11}

Table 2: False Alalrm

With $\pi^i_{jk} \geq 0$ and $\sum_{j=0}^{1} \sum_{k=0}^{1} \pi^i_{jk} = 1$. Further, $\Pr\big[s^i = j | \theta^i = k\big] = \dfrac{\pi^i_{jk}}{\pi^i_{jk} + \pi^i_{kk}}$; $j \neq k$ and $\Pr\big[s^i = k | \theta^i = k\big] = \dfrac{\pi^i_{kk}}{\pi^i_{jk} + \pi^i_{kk}}$; $j \neq k$. In what follows we only present the case for *missed alarm* since the other case is qualitatively similar. The game involves five periods. In the first period, the government determines the total number of citizens that can be arrested who appear to be loyal (i.e., the citizens from whom the government receives the signal $s = 0$). In the second period, the government decides how much importance to attach to human rights violations. Observing the above decisions, the members of the minority and the majority decide whether or not to participate in the insurgency in the third period. A representative member of the minority receives a payoff of $U^A_m = U - a$ if they do not participate in the insurgency and is not wrongfully arrested by the government. Similarly, a loyalist in the majority receives a payoff of $U_M^A = U$ if not arrested. In this context, a captures the degree of political/economic inequality between the majority and the minority. Petrova (2008) uses a similar notion of income inequality.[3] Tezcür (2016) finds that a citizen may become a rebel and join the insurgency by weighing the costs and benefits from joining the insurgency. The benefits could be material or intangible such as security obtained from joining the insurgency against the aggression of the state or he/she may be motivated by concerns about collective identity. Consequently, we assume that a citizen belong to the minority group participating in an insurgency receives a payoff of b_m (provided he/she is not arrested) which is privately observed but drawn from a known distribution function with the c.d.f F with support $(\beta, 2\beta)$. Similarly, we will assume that a citizen belonging to the majority receives a pay-off of b_M for joining the insurgency (if not arrested) which is also privately observed but drawn from a known distribution function with the c.d.f G with support $(\sigma, 2\sigma)$ with $\sigma \neq \beta$. The return from being a rebel is assumed to be different across both groups to allow for the possibility that a higher, equal or smaller proportion of insurgents may be comprised of the majority.[4] This may be because that members of the majority may have access to larger or smaller networks than the minority that they may draw support from who are supportive to their cause. Further, members from the majority may also be more educated and are able to plan attacks or defend against the autocracy and generally occupy positions of authority. On the other hand, insurgents from the minority may also be adversarial towards members of the majority and relegate them to marginal posts or responsibilities with lower returns. Any citizens arrested by the government receives a payoff of 0. In the fourth period, the government receives noisy signals about each citizen about whether or not the citizen is a part of the insurgency. The government then decides whether or not to arrest a citizen based on the signal it receives. In the last stage the government and the insurgents engage in a contest where the government

[3]In her model, α of citizens earn an income of W_H and the rest of the citizens earn W_H.

[4]By not constraining the returns b_M and b_m to be drawn from the same distribution we free ourselves from the necessarily implication that a smaller fraction of the majority will join the insurgency since the majority have a higher reservation utility which implicitly means that members of the minority will be arrested with higher probability just because they represent a larger fraction of the insurgency.

quells the insurgency with probability p. Following Che and Gale (2000) we use a piece-wise linear contest success function given by $p = max\left\{min\left\{\frac{1}{2} + f(e-r), 1\right\}, 0\right\}$ where e denotes the effort devoted by the government and r denotes the size of the insurgency. We assume that each member of the insurgency exerts one unit of effort inelastically to defeat the autocrat. Skaperdas and Vaidya (2012) explore a similar contest function. It is easy to check that the contest success function described above satisfies condition (A5') in Skaperdas (1996) and hence satisfies all the desirable properties such as A1) Imperfect Discrimination A2) Monotonicity A3) Anonymity A4) Consistency and A5) Independence.

The government arrests a given citizen with probability α_s^i if it receives a signal s^i for $i \in \{m, M\}$. As a result, the number of rebels in each group is given by the following:

$$\begin{aligned} r_m =& \mu_m \Pr[\theta^m = 1] \left\{1 - \sum_s \alpha_s^m \Pr[s^m|\theta^m = 1]\right\}, \\ =& \frac{\Pr[\theta^m = 1]}{1+t} \left\{1 - \sum_s \alpha_s^m \Pr[s^m|\theta^m = 1]\right\}. \end{aligned} \tag{1}$$

where $\mu_m \Pr[\theta^m = 1]$ captures the fraction of the minority participating in the insurgency. Note that anyone who sends a signal $s^m = 0$ is arrested with probability α_0^m and anyone who sends the signal $s^m = 1$ is arrested with probability α_1^m. Therefore $\left\{1 - \sum_s \alpha_s^m \Pr[s^m|\theta^m = 1]\right\}$ captures the probability that a rebel from the minority is not arrested. Similarly,

$$\begin{aligned} r_M =& \mu_M \Pr\left[\theta^M = 1\right] \left\{1 - \sum_s \alpha_s^M \Pr\left[s^M|\theta^M = 1\right]\right\}, \\ =& \frac{\Pr\left[\theta^M = 1\right]}{1+t} \left\{1 - \sum_s \alpha_s^M \Pr\left[s^M|\theta^M = 1\right]\right\}. \end{aligned} \tag{2}$$

As a result, the total number of rebels in the insurgency is given by:

$$
\begin{aligned}
r =& r_m + r_M \\
=& \frac{\Pr[\theta^m = 1]}{1+t}\left\{1 - \sum_s \alpha_s^m \Pr[s^m|\theta^m = 1]\right\}, \\
+& \frac{\Pr\left[\theta^M = 1\right]}{1+t}\left\{1 - \sum_s \alpha_s^M \Pr\left[s^M|\theta^M = 1\right]\right\}.
\end{aligned} \tag{3}
$$

It is straightforward to see that the total probability of arresting an insurgent is given by $\sum_s \alpha_s^i \Pr[s^i|\theta^i = 1]$ for $i \in \{m, M\}$. Further, note that the number of loyal citizens who are wrongfully arrested by the government is given by $\sum_s \alpha_s^i \Pr[s^i] \Pr[\theta^i = 0|s^i]$ for $i \in \{m, M\}$. Let δ represent the importance the autocrat attaches to human rights violations (the expected number of innocent citizens who are arrested). Further, the number of people who are arrested with a signal 0 from each group is given by $\mu_i \alpha_0^i \Pr[s^i = 0]$ for $i \in \{m, M\}$. Let $C_0^i(\mu_i \alpha_0^i \Pr[s^i = 0])$ for $i \in \{m, M\}$ be the total administrative cost of arresting all the citizens arrested with a signal zero. Similarly, note that the total number of citizens who are arrested from each group with the signal 1 is given by $\mu_i \alpha_1^i \Pr[s^i = 1]$ for $i \in \{m, M\}$. Further, let $C_1^i(\mu_i \alpha_1^i \Pr[s^i = 1])$ be the total administrative cost of arresting everyone with a signal 'one' for $i \in \{m, M\}$. Since, the autocrat may discriminate between which group members to arrest with higher probabilities, we have assumed the cost functions to be additively separable across groups for every signal s^i. The governments payoff is given by the following equation:

$$
\begin{aligned}
U^A =& p\tilde{U} - \gamma e^2 - \delta\left\{\sum_i \sum_s \mu_i \alpha_s^i \Pr\left[s^i\right] \Pr\left[\theta^i = 0|s^i\right]\right\} \\
&- \sum_i C_0^i(\mu_i \alpha_0^i \Pr\left[s^i = 0\right]) \\
&- \sum_i C_1^i(\mu_i \alpha_1^i \Pr\left[s^i = 1\right]) \quad i \in \{m, M\}.
\end{aligned} \tag{4}
$$

The first term in equation (4) captures the expected benefit of defeating the insurgency. The second term captures the cost of fighting the insurgency. The third term captures the loss in expected payoff the autocrat suffers from arresting innocent citizens. The fourth and the fifth term capture the administrative cost of incarcerating or punishing the citizens who are arrested. We proceed to solve the game backwards.

4 Missed Alarm under Autocracy

In this section, we will assume that the government does not receive a signal $s^i = 1$ from a loyalist, i.e., the Table 1 applies for $i \in \{m, M\}$. As a result, the conditional probabilities reduce to the following:

$$\begin{aligned}\Pr\left[s^i = 1 | \theta^i = 0\right] =& \frac{\Pr[s^i = 1, \theta^i = 0]}{\Pr[\theta^i = 0]}, \\ =& 0.\end{aligned}$$

Similarly,

$$\begin{aligned}\Pr\left[s^i = 0 | \theta^i = 0\right] =& \frac{\Pr[s^i = 0, \theta^i = 0]}{\Pr[\theta^i = 0]}, \\ =& 1.\end{aligned}$$

Further,

$$\begin{aligned}\Pr\left[s^i = 0 | \theta^i = 1\right] =& \frac{\Pr[s^i = 0, \theta^i = 1]}{\Pr[\theta^i = 1]}, \\ =& \frac{\pi^i_{01}}{\pi^i_{01} + \pi^i_{11}}.\end{aligned}$$

and

$$\begin{aligned}\Pr\left[s^i = 1 | \theta^i = 1\right] =& \frac{\Pr[s^i = 1, \theta^i = 1]}{\Pr[\theta^i = 1]}, \\ =& \frac{\pi^i_{11}}{\pi^i_{01} + \pi^i_{11}}.\end{aligned}$$

Since we solve the game backwards, we begin with stage 5 where the government decides how much effort to exert to win the contest.

4.1 Stage 5: The Autocrats Effort in Equilibrium

In the case of missed alarm the governments objective function can be shown to reduce to the following:

$$
\begin{aligned}
U^A =& p\tilde{U} - \gamma e^2 - \frac{\delta}{1+t}\left(\alpha_0^m \pi_{00}^m + t\alpha_0^M \pi_{00}^M\right) \\
&- c_0^m \left(\frac{\alpha_0^m(\pi_{00}^m + \pi_{01}^m)}{1+t}\right) - c_0^M \left(\frac{t\alpha_0^M(\pi_{00}^M + \pi_{01}^M)}{1+t}\right) \\
&- c_1^m \left(\frac{\alpha_1^m \pi_{11}^m}{1+t}\right) - c_1^M \left(\frac{t\alpha_1^M \pi_{11}^M}{1+t}\right).
\end{aligned} \tag{5}
$$

Equation (5) can be interpreted along the same lines as equation (4).[5] Since, a loyalist does not send a signal $s = 1$ in this scenario, any member who sends the signal $s = 1$ must be an insurgent. In this stage, the government maximizes equation (5) with respect to the choice of e which yields:

$$
\begin{aligned}
\frac{\partial U^A}{\partial e} =& \tilde{U}\frac{\partial p}{\partial e} - 2\gamma e, \\
=& \tilde{U} f - 2\gamma e, \\
=& 0.
\end{aligned} \tag{6}
$$

The government exerts effort such that the expected marginal utility of winning against the insurgency is equal to the marginal cost of expending effort. In the next subsection, we analyze the probability of an arrest for each group.

4.2 Stage 4: The Probabilities of Being Arrested in Equilbrium

First, we analyze the number of members from each group who participate in the insurgency. Recall that r_m and r_M represent the number of citizens from the minority and the majority who join the insurgency respectively. Further, recall that α_0^i and α_1^i denote the probabilities with which a loyalist and an insurgent is arrested from each group. The

[5] We assume that the administrative cost of incarcerating or punishing members from each group is separable.This is done to highlight the trade-off the government faces between arresting citizens from the minority and the majority.

members who remain in the insurgency are those that are not arrested. Since the probability that an insurgent sends a signal that he/she is a loyalist is given by π_{01}^{i} from each group. As a result, the number of insurgent from the minority group is given by:

$$
\begin{aligned}
r_m =& \mu_m \Pr[\theta^m = 1] \left\{ 1 - \sum_s \alpha_s^m \Pr[s^m | \theta^m = 1] \right\}, \\
=& \frac{\pi_{01}^m + \pi_{11}^m}{1+t} \left[\frac{(1-\alpha_0^m)\pi_{01}^m}{\pi_{01}^m + \pi_{11}^m} + \frac{(1-\alpha_1^m)\pi_{11}^m}{\pi_{01}^m + \pi_{11}^m} \right], \\
=& \frac{1}{1+t} \left[(1-\alpha_0^m)\pi_{01}^m + (1-\alpha_1^m)\pi_{11}^m \right] \cdot
\end{aligned}
\tag{7}
$$

Similarly, the number of insurgents from the majority group is given by the following expression:

$$
\begin{aligned}
r_M =& \mu_M \Pr\left[\theta^M = 1\right] \left\{ 1 - \sum_s \alpha_s^M \Pr\left[s^M | \theta^M = 1\right] \right\}, \\
=& \frac{t(\pi_{01}^M + \pi_{11}^M)}{1+t} \left[\frac{(1-\alpha_0^M)\pi_{01}^M}{\pi_{01}^M + \pi_{11}^M} + \frac{(1-\alpha_1^M)\pi_{11}^M}{\pi_{01}^M + \pi_{11}^M} \right], \\
=& \frac{t}{1+t} \left[(1-\alpha_0^M)\pi_{01}^M + (1-\alpha_1^M)\pi_{11}^M \right] \cdot
\end{aligned}
\tag{8}
$$

Therefore, the total number of insurgents is given by:

$$
\begin{aligned}
r =& r_m + r_M, \\
=& \frac{1}{1+t} \left[(1-\alpha_0^m)\pi_{01}^m + (1-\alpha_1^m)\pi_{11}^m \right] \\
+& \frac{t}{1+t} \left[(1-\alpha_0^M)\pi_{01}^M + (1-\alpha_1^M)\pi_{11}^M \right] \cdot
\end{aligned}
\tag{9}
$$

We will assume that the autocrat can, at any point, arrest only $\bar{\alpha}$ number of citizens who send the signal $s = 0$. This may reflect the resource constraint placed on the autocrat by the availability of law enforcement officials who must investigate each case. It could also arise because of the time it takes to process and determine whether or not a citizen who sends a signal is a rebel or not. It could also be because of space and/or other budget constraints. Consequently, we must have the following:

$$\begin{aligned}\bar{\alpha} =&\mu_m \alpha_0^m(\pi_{00}^m + \pi_{01}^m) + \mu_M \alpha_0^M(\pi_{00}^M + \pi_{01}^M), \\ =&\frac{\alpha_0^m}{1+t}(\pi_{00}^m + \pi_{01}^m) + \frac{t\alpha_0^M}{1+t}(\pi_{00}^M + \pi_{01}^M).\end{aligned} \tag{10}$$

Equation (10) implies that the government faces a trade-off in terms of arresting citizens from each group because of the resource constraint. Next, for simplicity, we make the following assumption.

Assumption 1: $c_s^{i'}(x) = x$. Assumption 1 implies that the marginal administrative cost of incarceration across each group and signal is linear.[6]

Note that using equation (10), equation (9) can be re-written as:

$$\begin{aligned}r =&\frac{\pi_{01}^m}{1+t} + \frac{t\pi_{01}^M}{1+t} - \frac{\bar{\alpha}\pi_{01}^M}{\pi_{00}^M + \pi_{01}^M} \\ &+\frac{(1-\alpha_1^m)\pi_{11}^m}{1+t} + \frac{t(1-\alpha_1^M)\pi_{11}^M}{1+t} \\ &+\frac{\alpha_0^m}{1+t}(\pi_{00}^m + \pi_{01}^m)\left\{\frac{\pi_{01}^M}{(\pi_{00}^M + \pi_{01}^M)} - \frac{\pi_{01}^m}{(\pi_{00}^m + \pi_{01}^m)}\right\}.\end{aligned} \tag{11}$$

Consequently, we observe that $\frac{\partial r}{\partial \alpha_0^m} = \frac{(\pi_{00}^m + \pi_{01}^m)}{1+t}\left\{\frac{\pi_{01}^M}{(\pi_{00}^M + \pi_{01}^M)} - \frac{\pi_{01}^m}{(\pi_{00}^m + \pi_{01}^m)}\right\}$. Notice that since, the autocrat cannot arrest more than $\bar{\alpha}$ fraction of citizens who send the signal zero, a rise in the probability of an arrest for the minority must be balanced by a reduction in the probability of an arrest for the majority. As a result, the size of the insurgency may increase or decrease depending on the difference between the expected proportion of insurgents who send the signal 'zero' among all those who send the same signal in each group. As a result, the government chooses the arrest rate, α_0^m, such that

[6]Our results are not altered qualitatively if the marginal administrative cost of incarceration is increasing.

the following holds:

$$\begin{aligned}\frac{\partial U}{\partial \alpha_0^m} =& \tilde{U}\frac{\partial p}{\partial r}\frac{\partial r}{\partial \alpha_0^m} - c_0^{m\prime}\left(\frac{\alpha_0^m(\pi_{00}^m+\pi_{01}^m)}{1+t}\right)\frac{(\pi_{00}^m+\pi_{01}^m)}{1+t} \\ &+ c_0^{M\prime}\left(\bar{\alpha} - \frac{\alpha_0^m(\pi_{00}^m+\pi_{01}^m)}{1+t}\right)\frac{(\pi_{00}^m+\pi_{01}^m)}{1+t} \\ &- \frac{\delta(\pi_{00}^m+\pi_{01}^m)}{1+t}\left\{\frac{\pi_{01}^M}{\pi_{00}^M+\pi_{01}^M} - \frac{\pi_{01}^m}{\pi_{00}^m+\pi_{01}^m}\right\}\end{aligned} \tag{12}$$

The first term in equation (12) captures the marginal benefit of increasing the probability of an arrest for the minority. Note that a small rise in the probability of an arrest for the minority increases the cost of incarcerating minorities. Since, the total number of people that can be arrested is constant in this stage, any rise in the expected number of citizens arrested from the minority must be compensated by a reduction in the expected number of citizens from the majority. As the expected number of people arrested from the majority falls, the cost of incarceration falls as well. Hence, the second and the third term capture the net change in expected costs due to a small change in the probability of an arrest for the minority. The last term captures the loss in utility from capturing loyalists. After some algebra, the probability of an arrest in equilibrium can be shown to be:

$$\alpha_0^{m*} = \frac{(1+t)(\bar{\alpha} - T_0(1+\delta))}{(\pi_{00}^m+\pi_{01}^m)} \tag{13}$$

where $T_0 = \left\{\frac{\pi_{01}^M}{\pi_{00}^M+\pi_{01}^M} - \frac{\pi_{01}^m}{\pi_{00}^m+\pi_{01}^m}\right\} \lesseqgtr 0$ captures the difference in the expected proportion of insurgents who send the signal 'zero' among all those who send the same signal from each group. Plugging equation (13) in equation (10), and solving for the probability of an arrest for the majority in equilibrium, yields:

$$\alpha_0^{M*} = \frac{(1+t)(\bar{\alpha} + T_0(1+\delta))}{t(\pi_{00}^m+\pi_{01}^m)} \tag{14}$$

Similarly, the first order condition for choosing the optimal α_1^m is given by:

$$\begin{aligned}\frac{\partial U^A}{\alpha_1^m} &= \tilde{U}\frac{\partial p}{\partial r}\frac{\partial r}{\partial \alpha_1^m} - c_1^{'m}\left(\frac{\alpha_1^m \pi_{11}^m}{1+t}\right)\frac{\pi_{11}^m}{1+t} \\ &= \tilde{U} f \frac{\pi_{11}^m}{1+t} - \alpha_1^m \left(\frac{\pi_{11}^m}{1+t}\right)^2\end{aligned} \tag{15}$$

Equation (15) can be interpreted along similar lines. The first term captures the net increase in the autocrat's expected payoff that occurs when a citizen who sends a signal 'one' is arrested from the minority. The second term captures the increase in the marginal cost of incarcerating any citizen from the minority who sends the signal 'one'. Without any loss of generality, we normalize $\tilde{U}f = 1$. As a consequence, equation (15) reduces to the following:

$$\frac{\partial U^A}{\alpha_1^m} = \frac{\pi_{11}^m}{1+t} - \alpha_1^m \left(\frac{\pi_{11}^m}{1+t}\right)^2 > 0 \implies \alpha_1^{m*} = 1$$

Similarly, we also have $\alpha_1^{M*} = 1$. Since under missed alarm, anyone sending the signal $s = 1$ can only be a rebel, he/she is arrested with certainty regardless of whether she belongs to the minority or the majority. We turn to analyzing the equilibrium size of the insurgency in the next subsection.

4.3 Stage 3: Equilibrium size of the Insurgency

In this stage, members from each group decide whether or not to join the insurgency. First, let us consider the net expected return from joining an insurgency for a member from either group. Following Tezcür (2016), we remain agnostic about why an insurgent may derive some sort of benefit from joining the insurgency provided she/he is not arrested. Let R^i represent the net expected return from participating in an insurgency for a member from either group. We will assume that any member of the insurgency who is arrested receives a utility of zero. Let b_i be the gross return for participating in the insurgency. Recall that b_m and b_M are assumed to follow distributions with c.d.f of F and G with support over the interval $[\beta, 2\beta]$ and $[\sigma, 2\sigma]$ respectively for some β and $\sigma \in \mathbb{R}+$

with $\sigma \neq \beta$. Therefore, R_i is given by:

$$\begin{aligned} R_m =& \left\{ 1 - \sum_s \alpha_s^m \Pr[s^m | \theta s^m = 1] \right\} b_m, \\ =& \frac{(1-\alpha_0^m)\pi_{01}^m b_m}{\pi_{01}^m + \pi_{11}^m}. \end{aligned} \tag{16}$$

The bracketed term in equation (17) captures the probability that an insurgent belonging to the minority is not arrested. Since an insurgent receives a payoff of zero if arrested, the expected payoff from joining the insurgency for a member of the minority is captured by R_m. Similarly, the return of being a loyalist for a member of the minority is given by, L_m, which is given by the following equation:

$$\begin{aligned} L_m =& \left\{ 1 - \sum_s \alpha_s^m \Pr[s^m | \theta^m = 0] \right\} U_m, \\ =& (1-\alpha_0^m) U_m. \end{aligned} \tag{17}$$

Similarly, we can derive the expected return for participating in the insurgency and the expected return from being a loyalist for the majority. The expressions can be obtained by interchanging the superscripts and the subscripts containing m with M. Therefore, a member from either group joins the insurgency iff $R_i \geq L_i \implies \exists b_i^* \in \mathbb{R}$ such that $R_i - L_i = 0$.

Assumption 2: $\pi_{01}^i = \pi_{11}^i$. This assumption implies that in any group, an insurgent is equally likely to send either signal. As a consequence, $b_i^* = 2U_i$.

Assumption 3: Without any loss of generality, we assume that $U_m = \frac{1}{2}(U - a)$ and $U_M = \frac{1}{2}U$. Therefore, a captures the extent of political/economic inequality between the majority and the minority. We will assume that members within the same group receive the same utility/payoff from being a loyalist.

Therefore, $\Pr[\theta^i = 1] = \pi_{01}^i + \pi_{11}^i = \Pr[b \geq b_i^*] = 1 - F(b_i^*)$. Similarly, $\Pr[\theta^i = 0] = \pi_{00}^i = \Pr[b \leq b_i^*] = F(b_i^*)$. Clearly, $b_m^* = U - a$ and $b_M^* = U$. Further, given the distributions of b_m and b_M, we have $\pi_{01}^m = \dfrac{1 - F(b_m^*)}{2} = \pi_{11}^m$ and $\pi_{00}^m = F(b_m^*)$. Similarly, $\pi_{01}^M = \dfrac{1 - G(b_M^*)}{2} = \pi_{11}^M$ and $\pi_{00}^M = G(b_M^*)$. Plugging in the expressions obtained for

π^i_{00}, π^i_{11} and π^i_{01} in T_0 we obtain

$$T_0 = \left\{ \frac{1 - G(b^*_M)}{1 + G(b^*_M)} - \frac{1 - F(b^*_m)}{(1 + F(b^*_m)} \right\} \tag{18}$$

Note that $\pi^i_{00} + \pi^i_{01}$ is the total probability of receiving the signal 'zero'. Further, the probability that an insurgent sends the signal zero is given by π^i_{01}. Therefore, $\frac{\pi^i_{01}}{\pi^i_{00} + \pi^i_{01}}$ represents the relative frequency of receiving a signal 'zero' from an insurgent from either group. As a consequence, T_0 captures the difference in the relative frequency. If $T_0 > 0$, then the frequency of receiving a signal zero from an insurgent is higher in the majority group. The exact opposite occurs when $T_0 < 0$.

4.4 Stage 2: The importance of human rights violations

Since the intelligence is imperfect, some innocent citizens from either group may be caught wrongfully which results in human rights violations. In this subsection, the autocrat determines how much weight to attach to human rights violations given that it wants to quell the insurgency. Recall that the autocrat maximizes the following function:

$$\begin{aligned} U_A =& \frac{\tilde{U}}{2} + (e - r) - \gamma e^2 - \frac{\delta \bar{\alpha} \pi^M_{00}}{\pi^M_{00} + \pi^M_{01}} \\ &- \frac{\delta \alpha^m_0 (\pi^m_{00} + \pi^m_{01})}{(1+t)} - c^m_0 \left(\frac{\alpha^m_0 (\pi^m_{00} + \pi^m_{01})}{(1+t)} \right) \\ &- c^M_0 \left(\bar{\alpha} - \frac{\alpha^m_0 (\pi^m_{00} + \pi^m_{01})}{(1+t)} \right) - c^m_1 \left(\frac{\alpha^m_1 \pi^m_{11}}{(1+t)} \right) \\ &- c^M_1 \left(\frac{t \alpha^M_1 \pi^M_{11}}{(1+t)} \right) \end{aligned} \tag{19}$$

The first two terms of equation (19) represent the benefit the autocrat receives by defeating the insurgency. The second and third term capture the weighted loss in the autocrats payoff due to human rights violations. The rest of the terms capture the expected cost of incarcerating people from each group with the signals 'zero' and 'one'. Recall that since the signal 'one' can only be sent by an insurgent, anyone who sends the signal regardless of group must be an insurgent and hence is arrested with certainty. However, since the signal 'zero' can be sent by both an insurgent and an innocent citizen, the autocrat arrests anyone who sends the signal 'zero' with some probability but not with certainty. Differentiating equation (19) with respect to δ using equations (13), (14), and the fact that $\alpha_1^m = 1 = \alpha_1^M$ and some algebra yields:

$$\begin{aligned}\frac{\partial U_A}{\partial \delta} =& \frac{\partial p}{\partial r}\frac{\partial r}{\partial \delta} - 2\bar{\alpha}\frac{G(b_M^*)}{1+G(b_M^*)} - \frac{\delta(\bar{\alpha} - T_0(1+\delta))T_0}{2} \\ &+ \frac{\delta}{2}T_0^2 + c_0^{m\prime}\left(\frac{\bar{\alpha}}{2} - \frac{T_0(1+\delta)}{2}\right) \\ &- c_0^{M\prime}\left(\frac{\bar{\alpha}}{2} + \frac{T_0(1+\delta)}{2}\right)\end{aligned} \tag{20}$$

The first term in equation (20) represent the marginal benefit from an increase in δ which comes from reducing the size of the insurgency. The second, third and the fourth term capture the net loss in payoff due to an increase in the weight δ. The fifth and the sixth term capture the net change in the cost of incarceration which offset each other. After some algebra, equation (20) boils down to the following:

$$\begin{aligned}\frac{\partial U_A}{\partial \delta} =& -\frac{\partial r}{\partial \delta} - 2\bar{\alpha}\frac{G(b_M^*)}{1+G(b_M^*)} - \frac{T_0(\bar{\alpha} - \delta T_0)}{2} \\ =& -2\bar{\alpha}\frac{G(b_M^*)}{1+G(b_M^*)} - \frac{T_0(\bar{\alpha} - T_0(1+\delta))}{2} < 0 \\ &\implies \delta^* = 0\end{aligned}$$

Lemma 1: *In equilibrium the autocrat does not attach any weight to human rights violations.*

Proof: *See Appendix.*

Comment: We note that in equilibrium $\delta^* = 0$. This happens because of the following reason: First, consider the case where $T_0 > 0$. In that case, recall that a rise in δ decreases the probability of an arrest for the minority and increases the probability of arrests on the majority. Since $T_0 > 0$, the frequency of a signal 'zero' coming from an insurgent in the majority group is higher than that in the minority. Hence, a marginal increase in the probability of an arrest for the majority reduces the size of the insurgency. However, since the intelligence is faulty some non-insurgents must end up being incarcerated which decreases the payoff of the autocrat if he/she attaches any weight to human rights violations. As a consequence, the autocrat will only choose a positive weight if the decline in the size of the insurgency is sufficiently large so that the marginal increase in the expected payoff (from defeating the insurgency) is large enough to offset the decrease the payoff resulting from human rights violations. As it turns out, the fall in the size of the insurgency is not sufficiently large for the autocrat to attach a positive weight on human rights violations. When $T_0 < 0$, a rise in δ increases the probability of an arrest for the minority. Since the frequency of the signal 'zero' is more likely to come from the minority group, a larger probability of an arrest for the minority implies a decline in the size of the insurgency. The rest of the argument is similar. In the next subsection, we endogenise the choice of $\bar{\alpha}$ from the perspective of the autocrat.

4.5 Stage 1: The number of citizens arrested in Equilibrium

Given that the autocrat does not attach any weight to human rights violations, the payoff function for the autocrat reduces to the following:

$$\begin{aligned} U_A =& \frac{\tilde{U}}{2} + (e-r) - \gamma e^2 - c_0^m\left(\frac{\bar{\alpha}}{2} - \frac{T_0}{2}\right) - c_0^M\left(\frac{\bar{\alpha}}{2} + \frac{T_0}{2}\right) \\ & - c_1^m\left(\frac{\alpha_1^m \pi_{11}^m}{(1+t)}\right) - c_1^M\left(\frac{t\alpha_1^M \pi_{11}^M}{(1+t)}\right) \end{aligned} \tag{21}$$

Differentiating equation (21) with respect to $\bar{\alpha}$ and some algebra yields:

$$\frac{\partial U_A}{\partial \bar{\alpha}} = \frac{\partial r}{\partial \bar{\alpha}} - c_0^{m\prime}\left(\frac{\bar{\alpha}}{2} - \frac{T_0}{2}\right)\frac{1}{2} - c_0^{M\prime}\left(\frac{\bar{\alpha}}{2} + \frac{T_0}{2}\right)\frac{1}{2} \tag{22}$$

The first term in equation (22) is the increase in the expected payoff of the autocrat that comes from a fall in the size of the insurgency due to an increase in the arrest capacity, $\bar{\alpha}$. The second term captures the additional cost the autocrat incurs by arresting a larger fraction of the population. In equilibrium, the autocrat chooses an arrest capacity to balance these two opposing effects. After some algebra, we can show that

$$\begin{aligned}\frac{\partial U_A}{\partial \bar{\alpha}} &= -\frac{\partial r}{\partial \bar{\alpha}} - \frac{\bar{\alpha}}{2} \\ &= \frac{1}{2}\left\{\frac{1-G(b_M^*)}{1+G(b_M^*)} + \frac{1-F(b_m^*)}{1+F(b_m^*)}\right\} - \frac{\bar{\alpha}}{2}\end{aligned}$$

As a result, in equilibrium, the arrest capacity is given by:

$$\bar{\alpha}^* = \left\{\frac{1-G(b_M^*)}{1+G(b_M^*)} + \frac{1-F(b_m^*)}{1+F(b_m^*)}\right\} \quad (23)$$

We analyze the effect of economic/political inequality in the next section.

5 Comparative Statics: The Effect of Inequality

In this section we formalize the effect of economic/political inequality on a) the total number of people the autocrat wants to arrest b) the probability of arrests c) the size of the insurgency d) the likelihood of the autocrat staying in power and e) the effect of imposing fairness standards.

Lemma 2: *A rise in inequality leads to an increase in the number of citizens the autocrat wants to arrest, i.e.,* $\frac{\partial \bar{\alpha}}{\partial a} > 0$.

Proof: *See Appendix.*

Comment: A rise in inequality, ceteris paribus, leads to an increases in the number of citizens (from the minority) to join the insurgency. Since a rise in the size of the insurgency reduces the probability of winning for the autocrat, it increases the marginal benefit of arresting more people. Since the marginal cost does not change, the autocrat responds by increasing $\bar{\alpha}$.

Lemma 3: *If G first-order stochastically dominates F, then $\exists t_0 \in (1, \infty)$ such that $\forall t > t_0$ $\alpha_0^{m*} > \alpha_0^{M*}$ i.e., among all citizens who send the signal 'zero', the autocrat arrests citizens from the minority with a higher probability than the majority provided that the majority is sufficiently larger than the minority.*

Proof: *See Appendix.*

Comment: Suppose that the autocrat chooses the same probability of an arrest, α_0, for both groups. If the the majority is sufficiently larger, more people from the majority will be arrested. Since the government faces an upper limit on the number of people with the signal 'zero' that can be arrested because of resource constraints, it must imply fewer people from the minority will be arrested. Now consider the decision to join the insurgency. On one hand, it depends on the return from not participating in the insurgency provided he/she is not arrested which is common knowledge. As is the case, citizens from the minority have a lower return from being loyalist than a citizen from the majority. Recall that in most insurgencies, the rebels fight to equalize socio-economic and political inequalities. Hence, citizens from the minority have a higher proclivity to join the insurgency (this is captured by the fact that F first-order stochastically dominates G and $b_M^* > b_m^*$). The second element comes from the reward from the insurgency. However, since the return from joining the insurgency is private information, the autocrat does not observe this and hence cannot act on it. Since the a priori reason prompts a greater fraction of the insurgents to come from the minority, using the same probability of arrests for both groups will increase the size of the insurgency (since more insurgents from the minority will not be arrested). Hence, the autocrat increases the probability of an arrest for the minority and lowers it for the majority. The intuition for the opposite case (when the majority is not sufficiently large) is similar.

Lemma 4: *A rise in inequality increases the probability of an arrest for citizens who send the signal 'zero' among the minority but does not alter the probability of an arrest for citizens who send the signal 'zero' among the majority, i.e.,* $\frac{\partial \alpha_0^{m*}}{\partial a} > 0$ *and* $\frac{\partial \alpha_0^{M*}}{\partial a} = 0$.

Proof: *See Appendix.*

Comment: A rise in inequality affects the probability of an arrest, α_0^{m*}, for the minority through three channels: A rise in inequality lowers the threshold return from joining the insurgency, which implies that a larger fraction of the minority now want to join the insurgency. This prompts the autocrat to increase the probability of an arrest. Further, as argued before, a rise in inequality increases the number of people the autocrat is willing to arrest which also increases the probability of an arrest for citizens who send the signal ‘zero’ among the minority. Finally, a rise in inequality also reduces the relative likelihood of a signal ’zero’ coming from an insurgent belonging to the majority (since a smaller fraction of the insurgency is comprised of the majority), hence it increases the probability of an arrest for the minority. Hence the probability of an arrest for the minority increases in equilibrium following a rise in inequality.

Now consider the effect of a rise in inequality on the probability of an arrest for the majority. On one hand a rise in inequality increases the number of people the autocrat is willing to arrest which tends to increase the probability of an arrest for the majority. However, since a rise in inequality also reduces that the signal ’zero’ comes from an insurgent belonging to the majority, it reduces the probability of an arrest for the majority. In the net these two effects exactly offset one another such that there is no net change in the probability of an arrest for the majority.

Lemma 5: *The size of the insurgency increases (decreases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.*

Proof: *See Appendix.*

Comment: A rise in inequality affects the size of the insurgency through two opposing channels: One one hand, it increases the probability of an arrest for the minority which decreases the size of the insurgency. However, it also increases the number of citizens from the minority who want to join the insurgency. The net effect depends on the relative magnitude of the two. If the return from joining the insurgency is below a certain threshold, then the first effect dominates the second one and the size of the insurgency decreases. However, if the return from joining the insurgency is above a certain threshold, then second effect dominates the first and the size of the insurgency increases.

Lemma 6: *The probability that the autocrat stays in power decreases (increases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.*

Proof: *See Appendix.*

Comment: Note that the probability of quelling the insurgency decreases (increases) with the a rise (fall) in the size of the insurgency. The rest of the intuition for this result follows directly from the intuition behind lemma 5.

Lemma 7: The index of human rights violations increases (decreases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.

Proof: *See Appendix.*

Comment: A rise in inequality affects the index of human rights violations through two channels. On one hand, it increases the probability of an arrest for a citizen of the minority who send the signal 'zero'. However, it also reduces the fraction of people who want to remain loyal to the autocrat which tends to reduce number of people who are non-insurgents. The net effect again depends on the relative magnitude of these two opposing forces. If the return from joining the insurgency is below a certain threshold, the first effect dominates the second. Hence, human rights violations may increase. However, if the return from joining the insurgency is above a certain threshold, then the second effect dominates the first one. In that case the human rights violations decline.

Lemma 8: *If G first-order dominates F and t is sufficiently large then imposing fairness standards is suboptimal for the autocrat.*

Proof: *See Appendix.*

Comment: Recall that the autocrat arrests citizens from the minority who send the signal 'zero' with a higher probability. Suppose that the autocrat is contemplating to equalize the probability of arresting a member of minority sending the signal 'zero' to the probability of arresting of arresting a member from the majority who sends the same signal. The marginal benefit of increasing α_0^m from that point is captured by $\bar{\alpha} - T_0$ and remains constant. However, as α_0^m increases, the net marginal cost rises.[7] It is easy to see that at this point the marginal benefit is still higher than the increase in net marginal cost. Therefore, the autocrat has no incentive to impose fairness.

[7]The net marginal cost is captured by $2\dfrac{\alpha_0^m(\pi_{00}^m + \pi_{01}^m)}{(1+t)}$.

6 Conclusion

We analyze a model of insurgency where the population is comprised of a minority and a majority. Citizens from each group decide whether or not to participate in an insurgency that aims to overthrow an autocratic government. The government cannot observe whether a citizen is an insurgent or not but receives imperfect signals that indicates the probability that the citizen is an insurgent. In the context of this paper, we consider two types of noisy signals. One in which a non-insurgent does not send a signal that he/she is a member of the insurgency and the other in which an insurgent does not send the signal that they are loyal. The strength of the insurgency is given by the number of citizens who take part in it. In this context, the government has two instruments to defeat the insurgency. First, the government can arrest the number of citizens who they think belong to the insurgency. This may reduce the size of the insurgency. Second it also devotes resources to the defeat the insurgency. In this context, we derive the effect of inequality on a) discrimination b) the size of the insurgency c) the index of human rights violations d) the total fraction of citizens with signal 'zero' the autocrat is willing to incarcerate e) the weight attached by the autocrat on the human rights violations, e) the probability that the autocrat stays in power and finally f) the effect of imposing fairness standards. Since our findings are qualitatively similar across both scenarios, we only choose to present the case for *missed alarm*.

Our findings can be summarized as follows: First, among people who send the signal 'zero' we find that the probability of an arrest is higher for a member of the minority in comparison to a member of the majority even when a larger fraction of the majority may be involved in the insurgency provided that the insurgency is sufficiently large. Further, an increase in inequality further exacerbates this asymmetry. Second, we find that the autocrat does not attach any weight to human rights violations. Third, we find that the autocrat is willing to arrest a larger fraction of citizens who appear to be innocent (send the signal 'zero') following a rise in inequality. Fourth, we find that the size of the insurgency may increase or decrease depending on whether the return from participating in the insurgency for the minority is greater or lesser than a certain threshold. The same implication is also reserved for the likelihood of the autocracy to remain in power. In this context, we find that the autocrat does not want to impose fairness standards since it reduces the payoff. Finally, we find that a rise in inequality may increase or decrease human rights violations depending on the whether the return for participating in the insurgency for the minority is greater or lesser than a certain threshold.

References

Bagchi, Aniruddha and Jomon A. Paul (2020). National security vs. human rights: A game theoretic analysis of the tension between these objectives. *European Journal of Operational Research*.

Benmelech, Efraim, Claude Berrebi, and Esteban F. Klor (2015). Counter-suicide-terrorism: Evidence from house demolitions. *The Journal of Politics 77*(1), 27–43.

Bueno de Mesquita, Ethan (2007). Politics and the suboptimal provision of counterterror. *International Organization 61*(1), 9?36.

Bueno De Mesquita, Ethan and Eric Dickson (2007, 4). The propaganda of the deed: Terrorism, counterterrorism, and mobilization. *American Journal of Political Science 51*(2), 364–381.

Che, Yeon-Koo and Ian Gale (2000). Difference-form contests and the robustness of all-pay auctions. *Games and Economic Behavior 30*(1), 22 – 43.

Cotton, Christopher and Cheng Li (2015). Profiling, screening, and criminal recruitment. *Journal of Public Economic Theory 17*(6), 964–985.

Daxecker, Ursula E. and Michael L. Hess (2013). Repression hurts: Coercive government responses and the demise of terrorist campaigns. *British Journal of Political Science 43*(3), 559?577.

Dragu, Tiberiu (2017). On repression and its effectiveness. *Journal of Theoretical Politics 29*(4), 599–622.

Dragu, Tiberiu and Mattias Polborn (2014). The rule of law in the fight against terrorism. *American Journal of Political Science 58*(2), 511–525.

Durlauf, Steven N. (2005, May). Racial profiling as a public policy question: Efficiency, equity, and ambiguity. *American Economic Review 95*(2), 132–136.

Knowles, John, Nicola Persico, and Petra Todd (1999). Racial bias in motor vehicle searches: Theory and evidence. Working Paper 7449, National Bureau of Economic Research.

Lake, David A. (2002). Rational extremism: Understanding terrorism in the twenty-first century. *Dialogue IO 1*(1), 15?28.

Persico, Nicola. (2002). Racial profiling, fairness, and effectiveness of policing. *American Economic Review 92*(5), 1472–97.

Petrova, Maria (2008). Inequality and media capture. *Journal of Public Economics 92*(1-2), 183–212.

Skaperdas, Stergios (1996, Jun). Contest success functions. *Economic Theory 7*(2), 283–290.

Skaperdas, Stergios and Samarth Vaidya (2012). Persuasion as a contest. *Economic Theory 51*(2), 465–486.

Tezcür, Güneş Murat (2016). Ordinary people, extraordinary risks: Participation in an ethnic rebellion. *American Political Science Review 110*(2), 247?264.

Wilkinson, P. (2011). *Terrorism Versus Democracy: The Liberal State Response.* Cass series on political violence. Taylor & Francis.

Appendix:

Lemma 1: *In equilibrium the autocrat does not attach any weight to human rights violations.*

Proof: From equation (20) we obtain the following:

$$\frac{\partial U_A}{\partial \delta} = -2\bar{\alpha}\frac{G(b_M^*)}{1+G(b_M^*)} - \frac{T_0(\bar{\alpha} - T_0(1+\delta))}{2}$$

Note that, $\frac{\partial^2 U_A}{\partial \delta^2} = \frac{T_0^2}{2} > 0$, therefore, U_A is convex with respect to δ. Hence, If U_A attains a maximum it must be at $\delta^* = 0$ otherwise it does not atain a maximum. First, consider the case where $T_0 > 0$. Clearly, $\frac{\partial U_A}{\partial \delta} < 0$ if $T_0 > 0$ since $(\bar{\alpha} - T_0(1+\delta)) > 0$. Therefore, $\delta^* = 0$ for $T_0 > 0$.

Now consider the case where $T_0 < 0$. Clearly $\frac{\alpha_0^m(\pi_{00}^m + \pi_{01}^m)}{(1+t)} = \frac{\bar{\alpha} - T_0(1+\delta))}{2} \leq \bar{\alpha} \in (0,1)$. Since $\frac{1-F(b_m^*)}{1+F(b_m^*)} \in (0,1)$ it is easy to establish that $T_0 = \frac{1-F(b_m^*)}{1+F(b_m^*)} - \frac{1-G(b_M^*)}{1+G(b_M^*)} < 2\frac{G(b_M^*)}{1+G(b_M^*)}$. Thus $\frac{\partial U_A}{\partial \delta} < 0 \implies \delta^* = 0$ ■

Lemma 2: *A rise in inequality leads to an increase in the number of citizens the autocrat wants to arrest, i.e.,* $\frac{\partial \bar{\alpha}}{\partial a} > 0$.

Proof: From equation (23) we have

$$\bar{\alpha}^* = \left\{ \frac{1-G(b_M^*)}{1+G(b_M^*)} + \frac{1-F(b_m^*)}{1+F(b_m^*)} \right\}$$

Differentiating with respect to a and noting that $b_m^* = U - a$ completes the proof ■

Lemma 3: *If G first-order stochastically dominates F, then $\exists t_0 \in (1, \infty)$ such that $\forall t > t_0$ $\alpha_0^{m*} > \alpha_0^{M*}$ i.e.,among all citizens who send the signal 'zero', the autocrat arrests citizens from the minority with a higher probability than the majority provided that the* *majority is sufficiently larger than the minority.*

Proof: Recall from equations (13) and (14) we have:

$$\alpha_0^{m*} = \frac{(1+t)(\bar{\alpha} - T_0))}{(\pi_{00}^m + \pi_{01}^m)}$$

and

$$\alpha_0^{M*} = \frac{(1+t)(\bar{\alpha} + T_0)}{(\pi_{00}^M + \pi_{01}^M)}$$

Further, recall that $\pi_{00}^m + \pi_{01}^m = F(b_m^*) + \frac{1 - F(b_m^*)}{2} = \frac{1 + F(b_m^*)}{2}\cdot$ Similarly, $\pi_{00}^M + \pi_{01}^M = \frac{1 + G(b_M^*)}{2}\cdot$ Plugging the expression for $\bar{\alpha}$ from equation (23) and the expression for T_0 from equation (18) and some algebra we get the following:

$$\alpha_0^{m*} = 2(1+t)\frac{1 - F(b_m^*)}{(1 + F(b_m^*))^2}$$

and

$$\alpha_0^{M*} = 2\frac{(1+t)}{t}\frac{1 - G(b_M^*)}{(1 + G(b_M^*))^2}$$

If G first-order stochastically dominates F then it is easy to show that $\frac{1 - F(b_m^*)}{(1 + F(b_m^*))^2} < \frac{1 - G(b_M^*)}{(1 + G(b_M^*))^2}\cdot$ Therefore, $\exists t_0 \in \mathbb{R}$ such that $\forall t > t_0$ $\frac{t(1 - F(b_m^*))}{(1 + F(b_m^*))^2} > \frac{1 - G(b_M^*)}{(1 + G(b_M^*))^2}\cdot$ As a result $\alpha_0^{m*} > \alpha_0^{M*}$ ■

Lemma 4: *A rise in inequality increases the probability of an arrest for citizens who send the signal 'zero' among the minority but does not alter the probability of an arrest for citizens who send the signal 'zero' among the majority, i.e.,* $\frac{\partial \alpha_0^{m*}}{\partial a} > 0$ *and* $\frac{\partial \alpha_0^{M*}}{\partial a} = 0$.

Proof: Differentiating $\alpha_0^{m*} = 2(1+t)\frac{1 - F(b_m^*)}{(1 + F(b_m^*))^2}$ and $\alpha_0^{M*} = 2\frac{(1+t)}{t}\frac{1 - G(b_M^*)}{(1 + G(b_M^*))^2}$ with respect to a yields the result ■

Lemma 5: *The size of the insurgency increases (decreases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.*

Proof: Plugging the expressions for π_{01}^m, π_{01}^M, α_0^{m*} and T_0 and some algebra we can show that

$$r = \frac{1 - F(b_m^*)}{2(1+t)} + \bar{\alpha}\frac{1 - G(b_M^*)}{1 + G(b_M^*)} + t\frac{1 - G(b_M^*)}{2(1+t)} + \frac{\bar{\alpha}T_0}{2} - \frac{T_0^2}{2} \tag{24}$$

Differentiating equation (24) with respect to a and some algebra yields:

$$\begin{aligned}\frac{\partial r}{\partial a} =& \frac{f(b_m^*)}{2(1+t)} - \frac{1 - G(b_M^*)}{1 + G(b_M^*)}\frac{\partial \bar{\alpha}}{\partial a} + \frac{T_0}{2}\frac{\partial \bar{\alpha}}{\partial a} + (\frac{\bar{\alpha}}{2} - T_0)\frac{\partial T_0}{\partial a} \\ =& \frac{f(b_m^*)}{(1 + F(b_m^*))^3}\left[(1 + F(b_m^*))^3 - 8(1+t)(1 - F(b_m^*)\right]\end{aligned} \tag{25}$$

Since $F(.)$ is continuous and monotonic in the interval $(\beta, 2\beta)$ and $F(.) \in [0,1]$ $\exists \tilde{b}_m^* \in (\beta, 2\beta)$ such that $\forall b_m^* < \tilde{b}_m^*$, $\frac{\partial r}{\partial a} < 0$ and $\forall b_m^* > \tilde{b}_m^*$ $\frac{\partial r}{\partial a} > 0$ ■

Lemma 6: *The probability that the autocrat stays in power decreases (increases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.*

Proof: Since $\frac{\partial p}{\partial a} = \frac{\partial p}{\partial r}\frac{\partial r}{\partial a}$. Combining $\frac{\partial p}{\partial r} < 0$ and Lemma 5 yields our result ■

Lemma 7: *The index of human rights violations increases (decreases) following a rise in inequality provided that the minimum return from joining the insurgency for the minority group is greater (lesser) than a certain threshold.*

Proof: The proof of the lemma is similar to the proof for Lemma 5 and hence omitted ■

Lemma 8: *If G first order stochastically dominates F and t is sufficiently large then Imposing fairness standards is suboptimal for the autocrat.*

Proof: We have already established that $\alpha_0^{m*} > \alpha_0^{M*}$ if G first-order stochastically dominates F and if t is sufficiently large, therefore, $\alpha_0^{m*} > \alpha_0^F$ where α_0^F is the probability of arrest under fairness. Since $\frac{\partial U_A}{\partial \alpha_0^m}|_{\alpha_0^m=\alpha_0^{m*}} = 0$ and $\frac{\partial^2 U_A}{\partial \alpha_0^{m2}} < 0$, $\frac{\partial U_A}{\partial \alpha_0^m}|_{\alpha_0^m=\alpha_0^F} > 0 \implies U_A|_{\alpha_0}^F < U_A|_{\alpha_0^{m*}}$ ■