Social Integration and Repression under Endogenous Corruption

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Abstract

We analyze a model with a population comprised of an immigrant minority and a majority facing a terrorist attack. Both communities commit resources to fight terrorism, a fraction of which is appropriated by a law enforcement agency. The government uses repression to hinder the probability of an attack. With this setup we endogenously determine the degree of corruption and repression. We find that corruption decreases and repression increases when the terrorist is more tolerant of repression. Further, we find that a larger minority results in more repression and a lower probability of attack. We also underline conditions such that greater social integration of the minority may lead to greater (lesser) repression and a lower (higher) probability of an attack and finally, investigate how an increase in the weight the government attaches to the payoff of the majority alters the provision of repression on the minority.

KEY WORDS: Social Integration; Free Speech; Terrorism; Corruption.

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1 Introduction:

The terrorist attacks on U.S in 2001, Spain in 2004 and U.K. in 2005 radically changed the purview of civic freedoms particularly for immigrant communities in many developed and developing countries. In many cases the lack sufficient information to sieve the potential terrorist from the larger communities in which they might hide prompted the government to adopt hawkish counter-terrorism policy, in the wake of an attack, often stemming from mounting public pressure to safeguard the security of its populace. The avenues through which the attacked government projects strength have taken a multitude of forms, which include among other things, repressive measures that limit civic liberties. Such measures, especially on immigrant communities, with the purport of dismantling social and operational networks of known and suspected terrorists, have been pursued by nearly every country that has endured a terrorist attack. For instance, the Patriot Act of 2001 in the US was followed by similar laws in Canada, Great Britain, Australia, South Africa and across several countries in Europe and Asia.

The repressive measures include but are not limited to, ethnic or racial profiling, enhanced surveillance of minorities, preemptive detention without access to lawyers, extrajudicial killings, etc. One essential aspect is that many of the countries that are mired by terrorist attacks also endure endemic corruption which may alter the efficiency and hence the provision of repression as a measure of counter-terrorism. Our goal in this paper is to highlight how exogenous institutional factors affect the level of repression, the degree of corruption and the probability of a terrorist attack in a country that harbors a terrorist. Although there is a substantial amount of literature on repression and its effectiveness, the number of papers that study the interaction between endogenous corruption and repression is fairly limited especially in the context of a majority and an immigrant minority. Further, we believe that we are the first to analyze how integration and the size of the minority affects the degree of corruption and the provision of repression in a country harboring a terrorist. We present a model where a country is comprised of a majority and an immigrant minority. The country also harbors a terrorist organization that claims to represent the minority. The majority and the immigrant minority contribute resources

to defend against any potential terrorist attack. The country also has a corrupt law enforcement agency that appropriates a fraction of the resource, earmarked for defense, for its own benefit. The degree of corruption depends on some exogenous institutional factors. The government of the country also determines the level of repression imposed on the minority. In this context, our main findings can be summarized as follows:

(a) We find that corruption decreases and repression increases, in equilibrium, when the terrorist is more tolerant of repression.

(b) Further, we also find that an increase in the size of the immigrant minority population increases repression, in equilibrium, but decreases the probability of an attack.

(c) We also show that greater social integration of the immigrant minority may lead to greater (lesser) repression, in equilibrium, but a lower (higher) probability of an attack if (a) the penalties associated with corruption are sufficiently large (small) and (b) the government suffers greater losses from a terrorist attack.

(d) Finally, we find that an increase in the weight the government attaches to the payoff of the majority increases repression, in equilibrium, on the minority provided that the expected loss to the majority from terrorism is larger. The exact opposite result is obtained when the expected loss from terrorism to the minority is larger.

We present the model in Section 2. The pay-off functions are laid out in subsection 2.1. The terrorists actions are analyzed in Section 3. Equilibrium level of corruption is analyzed in Section 4. Section 5 presents the choice of defense by the minority and the majority community. In section 6, we analyze the equilibrium choice of repression. Section 7 concludes.

2 Model

Consider a country that is inhabited by five different types of agents: an immigrant minority (m) of size μ_m, a majority(M) of size μ_M, a government (G), a corrupt law enforcement agency (L) and a terrorist organization (T). The government determines

the degree of repression that is imposed on the terrorist outfit. We assume that the terrorist outfit represents the minority population. The minority (m) and the majority (M) devote resources to combat the probability of an attack. The law enforcement agency (L) appropriates a fraction of the resources that are committed by the minority and the majority. The terrorist also expends resources/effort to attack. The timeline for the game is as follows:

1. The government (G) decides the amount of repression, denoted by f.

2. The minority (m) and majority (M) community decide on the amount of resources to contribute towards defense represented by d.

3. The law enforcement agency(L) decides what fraction of the resources to appropriate captured by σ.

4. The terrorist (T) decides how much of its resource, t to devote to terrorism.

The probability of a terrorist attack is given by a contest success function $p = \dfrac{t}{t + (1-\sigma)d}$ (see Skaperdas (1996)) where t is the amount of resource/effort expended by the terrorist and d is the total amount of resources on defense contributed by the communities with $d = \mu_m d_m + \mu_M d_M$. We assume that each member of the minority (majority) contributes the same amount towards defense. Further, let $\theta = \theta_0 e^{\frac{f}{f_0}}$ be the payoff to the terrorist following a successful attack where $f_0 \in \mathbb{R}_+$ represents the terrorist's tolerance for repression with higher values of f_0 implying higher tolerance, whereas, θ_0 represents the baseline payoff from terrorism when the government does not impose any repressive measures. In this context, Lake (2002) and Wilkinson (2011) find that repression can be detrimental to counterterrorism measures in communities whom the terrorist claim to represent. In a similar vein, Benmelech et al. (2015), Daxecker and Hess (2013) empirically find that repression often fomented further terrorist violence. The payoff functions of the agents are laid out in the next subsection.

2.1 Payoff Functions

The terrorist maximizes the following function:

$$\begin{aligned} V_T =& p\theta - c(f;\alpha)t, \\ =& \frac{t}{t+(1-\sigma)d}\theta_0 e^{\frac{f}{f_0}} - c(f;\alpha)t, \\ =& \frac{t}{t+(1-\sigma)d}\theta_0 e^{\frac{f}{f_0}} - \alpha f t. \end{aligned} \tag{1}$$

The first term in (1) is the expected payoff from an attack to the terrorist. The second term is the cost of expending effort. We will assume that the marginal cost of expending effort by the terrorist is constant and is affected parametrically by the degree of repression f and the degree of integration $\alpha \in [0,1]$. For any given level of integration, greater repression increases the marginal cost of expending effort. Similarly, for any given level of repression, greater integration of the minority community increases the marginal cost of terrorism. This may be because the terrorist's access to networks in the minority community gets more and more limited as the degree of integration increases or the community becomes less tolerant of radical ideology and suspicious activities and may report such behavior to the law enforcement or the government (see Richardson (2006) and Wilkinson (2011)). The minority community is completely integrated when $\alpha = 1$. Next, we layout the pay-off function of the law enforcement agency which is given by the following equation:

$$\begin{aligned} U_L =& \sigma d - \beta(\sigma) - F_0 p, \\ =& \sigma d - \beta d - F_0 p, \\ =& (1-\beta)\sigma d - F_0 p. \end{aligned} \tag{2}$$

The first term, σd, is the amount of resources appropriated by law enforcement, whereas, $\beta(\sigma d) = \beta\sigma d$, represents the transaction cost associated with corruption. We assume that the transaction cost is linear. The term, F_0, captures the fine that law enforcement pays in the event of a successful terrorist attack which may reflect being fired, facing criminal investigations due to willful negligence, etc (see Basu et al. (1992)). Next, we

turn to the payoff of the minority (m) and the majority (M). The payoff to the minority is given by the following equation:

$$\begin{aligned} U_m =&(1-p)\nu_0^m + p\nu_1^m + \alpha I(d_m) - \gamma(1+f)d_m, \\ =&\nu_0^m - \Delta_\nu^m p + \alpha I(d_m) - \gamma(1+f)d_m. \end{aligned} \tag{3}$$

Where ν_0^m captures the utility to a member of the minority in the event that there is no terrorist attack, while, ν_1^m captures the utility that accrues following a successful terrorist attack. Further, let $\alpha I(d_m)$ capture the benefit a member of the minority receives from expending resources to combat terrorism. Note that the benefit from contributing resources to defend against an attack increases with integration. The cost of expending resources to combat terrorism is assumed to be linear and captured by the term $\gamma(1+f)d_m$ where γ is the marginal cost of the resource. Following Dragu (2017), we assume that repression increases the marginal cost of expending resources for the minority. Similarly, the utility of the majority is given by the following function:

$$U_M = \nu_0^M - \Delta_\nu^M p + I(d_M) - \gamma d_M. \tag{4}$$

To isolate the effects of integration and repression on the minority, we will assume that the members of the majority are fully integrated and are insulated from the effects of repression. The terms in equation (4) carry the same interpretation as in equation (3). Finally, we turn to the payoff the government which is captured by the following equation:

$$\begin{aligned} U_G =&(1-p)U_0 + pU_1 + \lambda\mu_m U_m + (1-\lambda)\mu_M U_M - \varphi(f), \\ =&U_0 - p\Delta_G + \lambda\mu_m U_m + (1-\lambda)\mu_M U_M - \varphi(f), \\ =&\tilde{U} - p\Delta + \lambda\mu_m\left(\alpha I(d_m) - \gamma(1+f)d_m\right) \\ &+(1-\lambda)\mu_M\left(I(d_M) - \gamma d_M\right) - \varphi(f). \end{aligned} \tag{5}$$

where $\tilde{U} = \left(U_0 + \mu_m\lambda\nu_0^m + \mu_M(1-\lambda)\nu_0^M\right)$ and $\Delta = (\Delta_G + \mu_m\lambda\Delta_\nu^m + \mu_M(1-\lambda)\Delta_\nu^M)$. U_0 in equation (5) captures the utility the government receives in the event that there is no terrorist attack. The utility following a terrorist attack is captured by U_1. Further,

let λ be the weight the government attaches to the payoff of a member of the minority while a weight $(1-\lambda)$ is attached to the payoff of a member of a majority. Finally, $\varphi(f)$ represents the cost of imposing repression.

3 Terrorist's Actions

In this section, we analyze the equilibrium choice of effort from the perspective of the terrorist. The terrorist maximizes equation (1) with respect to t which yields:

$$\begin{aligned}\frac{\partial V_T}{\partial t} =&\theta_0 e^{\frac{f}{f_0}}\frac{\partial p}{\partial t} - \alpha f,\\ =&\theta_0 e^{\frac{f}{f_0}}\frac{(1-\sigma)d}{(t+(1-\sigma)d)^2} - \alpha f \\ =&0.\end{aligned} \tag{6}$$

In other words, the terrorist expends effort to the point such that the expected marginal return to the terrorist is equal to the marginal cost, which yields:

$$t^* = \left\{\frac{\theta_0(1-\sigma)d}{\alpha f}\right\}^{\frac{1}{2}} e^{\frac{f}{2f_0}} - (1-\sigma)d. \tag{7}$$

We find that V_T is strictly concave in t, as a result, an interior solution is obtained.

3.1 Comparative Statics

Now we investigate how the terrorist effort changes with respect to changes in d, σ, f and α.

Result 1: *The terrorist's effort decreases with respect to defense, repression, tolerance for repression and integration but increases with corruption.*

Proof: *Differentiating equation* (7) *with respect to defense, repression, integration, tolerance for repression and corruption gives us the result.*

Remark: *First, consider an increase in defense. A rise in defense, ceteris paribus, reduces the marginal return from expending effort for the terrorist. As a result, to restore*

equilibrium, the marginal cost must fall. Hence, the terrorist reduces effort in equilibrium. On the contrary, an increase in repression, affects the terrorist's effort in two ways: On one hand, it increases the marginal cost of exerting effort which tends to reduce the equilibrium level effort of the terrorist. On the other hand, it increases the marginal utility of terrorism which prompts the terrorist to increase effort. The net effect depends on the relative magnitude of the level of repression and the level of tolerance. If the level of repression is greater, then the terrorist exerts more effort which increases the probability of an attack. The exact opposite result is obtained when the level of tolerance is greater. The intuition for the increase in the level of tolerance can be argued along similar lines. Further, an increase in the level of integration, ceteris paribus, increases the marginal cost of effort of the terrorist. Since the marginal benefit does not change, the terrorist reduces effort in equilibrium. Finally, a rise in the degree of corruption, ceteris paribus, increases the marginal return from terrorism. Since the marginal cost remains unchanged, the terrorist increases effort in equilibrium.

4 Appropriation by Law Enforcement

The law enforcement agency maximizes its payoff given by equation (2) with respect to σ which yields:

$$\begin{aligned}\frac{\partial U_L}{\partial \sigma} =&(1-\beta)d - F_0\left\{\frac{\partial p}{\partial t}\frac{\partial t}{\partial \sigma}+\frac{\partial p}{\partial \sigma}\right\}\\ =&(1-\beta)d - \frac{F_0}{2}\left\{\frac{\alpha d f}{\theta_0(1-\sigma)}\right\}^{\frac{1}{2}} e^{\frac{-f}{2f_0}}\\ =&0.\end{aligned} \tag{8}$$

A rise in the degree of corruption increases the marginal benefit since a larger fraction of defense is appropriated. However, it also increases the expected marginal cost. First note that the law enforcement pays a fine in the event of an attack. A rise in the degree of corruption increases the probability of attack in two ways: First, appropriating

a larger share of the resource earmarked for defense increases the probability of an attack. Second, it also increases the probability of attack by increasing the terrorist's effort. As a consequence, the law enforcement agency chooses a degree of corruption that balances the marginal return from corruption with the expected marginal cost of corruption. Therefore, in equilibrium, the expression for corruption is given by:

$$\sigma^* = 1 - \frac{F_0^2}{4\theta_0} \frac{\alpha f}{d(1-\beta)^2} e^{\frac{-f}{f_0}} \tag{9}$$

We find that U_L is strictly concave in σ, as a consequence, an interior solution is obtained.

4.1 Comparative Statics

In this subsection, we analyze how the degree of corruption, σ, is affected by changes in defense, repression, integration and the tolerance for repression.

Result 2: *The degree of corruption increases with defense, may increase or decrease with respect to repression but decreases with the level of integration and tolerance for repression.*

Proof: *Differentiating equation* (9) *with respect to defense, repression, integration and the degree of tolerance gives us the result.*

Remark: *A rise in defense, affects the degree of corruption in two ways: First, it increases the marginal return from corruption, holding everything else constant. Second, it also increases the expected marginal cost of corruption. However, the rise in marginal benefit is larger than the rise in expected marginal cost. As a result, to restore equilibrium, the degree of corruption rises (since the probability of an attack increases with corruption).*

Now consider a rise in the level of repression. On one hand, a rise in repression increases the marginal cost of terrorism which prompts the terrorist to reduce effort. However, a rise in repression also increases the marginal utility of exerting effort. As a result, the terrorist may exert more effort. The overall effect depends on the relative magnitude of these two forces. We find that if the level of repression is greater than the

level of tolerance, then the terrorist increases effort which increases the probability of an attack. A rise in the probability of an attack reduces the marginal cost of corruption. As a consequence, the law enforcement agency increases corruption in equilibrium. The exact opposite result is obtained when the level of tolerance is greater than the level of repression. Now consider what happens when the terrorist's tolerance for repression increases. An increase in the terrorist tolerance for repression decreases the effort of the terrorist. As a consequence, the probability of an attack decreases. The decline in the probability of an attack increases the marginal cost of corruption. Hence, corruption decreases in equilibrium. Finally, consider a rise in the degree of integration. A rise in the degree of integration increases the marginal cost of terrorism. Therefore, the terrorist reduces effort which reduces the probability of an attack. The fall in the probability of an attack also increases the marginal cost of corruption, hence corruption falls in equilibrium.

5 Defense by Communities

In this section, we turn to analyze the choice of defense by the minority and the majority. A representative member of the minority maximizes equation (3) with respect to the choice of defense which yields:

$$\begin{aligned}\frac{\partial U_m}{\partial d_m} =& -\Delta_{\nu}^{m}\left\{x_m + y_m\right\} + \alpha I(d_m) - \gamma(1+f),\\ =&0.\end{aligned} \tag{10}$$

where

$$\begin{aligned}x_m =& \frac{\partial p}{\partial d_m} + \frac{\partial p}{\partial t}\frac{\partial t}{\partial d_m},\\ =& \frac{-m(1-\sigma)}{2\left(t+(1-\sigma)d\right)^2}\left\{\frac{\theta_0(1-\sigma)d}{\alpha f}\right\}^{\frac{1}{2}} e^{\frac{f}{2f_0}}.\end{aligned} \tag{11}$$

and

$$\begin{aligned} y_m =& \left\{ \frac{\partial p}{\partial t}\frac{\partial t}{\partial \sigma}\frac{\partial \sigma}{\partial d_m} + \frac{\partial p}{\partial \sigma}\frac{\partial \sigma}{\partial d_m} \right\}, \\ =& \frac{m(1-\sigma)}{2\left(t+(1-\sigma)d\right)^2} \left\{ \frac{\theta_0(1-\sigma)d}{\alpha f} \right\}^{\frac{1}{2}} e^{\frac{f}{2f_0}}. \end{aligned} \tag{12}$$

Clearly, $x_m + y_m = 0$. A rise in d_m reduces the probability of an attack both directly and through the reduction in the terrorist's effort. However, a rise in d_m also increases the degree of corruption which increases the probability of an attack. Further, a rise in the degree of corruption also increases the effort exerted by the terrorist which also increases the probability of an attack. As it turns out, these two effects offset each other so that there is no net reduction in the probability of an attack due to a change in d_m. Therefore, equation (10) boils down to the following:

$$\begin{aligned} \frac{\partial U_m}{\partial d_m} =& \alpha I(d_m) - \gamma(1+f), \\ =& 0. \end{aligned} \tag{13}$$

Equation (13) implies that the minority community expends effort such that the marginal utility of expending effort is equal to the marginal cost of doing so. In effect, the presence of corruption creates a disincentive for expending effort. In equilibrium, we find that $d_m^* = d_m(f; \gamma, \alpha)$.

Similarly, a member of the majority community maximizes equation (4) with respect to the choice of d_M which yields:

$$\begin{aligned} \frac{\partial U_M}{\partial d_M} =& -\Delta_\nu^M \left\{ x_M + y_M \right\} + I(d_M) - \gamma, \\ =& 0. \end{aligned} \tag{14}$$

As before, we find that $x_M + y_M = 0$. The reason is exactly similar to the one outlined previously. As a result, equation (14) boils down to the following:

$$\begin{aligned}\frac{\partial U_M}{\partial d_M} =& I(d_M) - \gamma, \\ =& 0.\end{aligned} \tag{15}$$

As a consequence, $d_M^* = d_M(\gamma)$. The provision of defense from the minority does not depend on the level of repression or integration.

5.1 Comparative Statics

Now we analyze how the choice of defense changes with respect to changes in repression and integration.

Result 3: *A rise in repression reduces the provision of defense from the perspective of the minority, whereas, a rise in the level of integration increases it.*

Proof: *Using the implicit function theorem and differentiating equation* (13) *with respect to repression and integration gives us the result.*

Remark: *A rise in repression increases the cost of providing defense for the representative member of the immigrant community. As a result, he/she reduces her contribution. However, we find that a rise in the level of integration increases the marginal utility of providing defense, as a consequence, the provision of defense increases. In effect, we find that that repression mitigates the legitimacy of counter terrorism in the eyes of the minority community which the terrorists claim to represent which may diminishes the efficacy of the policies targeted towards terrorism prevention. Similar findings, albeit in different contexts, are reported by Bueno De Mesquita and Dickson (2007), Cole (2005), Kydd and Walter (2006), Rosendorff and Sandler (2004), Sánchez-Cuenca and de la Calle (2009).*

6 Repression

In this section, we analyze the choice of repression from the perspective of the government. The government maximizes equation (5) with respect to repression, to yield:

$$\begin{aligned}\frac{\partial U_G}{\partial f} =& -\Delta\left\{x_0 + y_0 + z_o\right\} \\ & +\mu_m\lambda\left\{\alpha I'(d_m) - \gamma(1+f)\right\}\frac{\partial d_m}{\partial f} \\ & -\mu_m\lambda\gamma d_m \\ & +(1-\lambda)\mu_M\left\{I'(d_m) - \gamma\right\} \\ & -\varphi'(f).\end{aligned} \tag{16}$$

where

$$\begin{aligned}x_0 =& \frac{\partial p}{\partial t}\frac{\partial t}{\partial f}, \\ =& \frac{\alpha F_0(f-f_0)}{4\theta_0(1-\beta)f_0}e^{\frac{-f}{f_0}}\end{aligned} \tag{17}$$

and

$$\begin{aligned}y_0 =& \left\{\frac{\partial p}{\partial t}\frac{\partial t}{\partial \sigma} + \frac{\partial p}{\partial \sigma}\right\}\frac{\partial \sigma}{\partial f}, \\ =& \frac{\alpha F_0(f-f_0)}{4\theta_0(1-\beta)f_0}e^{\frac{-f}{f_0}}.\end{aligned} \tag{18}$$

Finally, using equations (11) and (12), we get

$$\begin{aligned}z_0 =& (x_m + y_m)\frac{\partial d_m}{\partial_f} \\ =& 0\end{aligned} \tag{19}$$

Further, using equations (13) and (15), equation (16) boils down to the following:

$$\begin{aligned}\frac{\partial U_G}{\partial f} =& -\Delta\frac{\alpha F_0(f-f_0)}{2\theta_0(1-\beta)}e^{\frac{-f}{f_0}} - \mu_m\lambda\gamma d_m - \varphi'(f), \\ =& 0\end{aligned} \tag{20}$$

The first term captures the marginal reduction in expected loss from a terrorism attack whereas the second and the third term capture the marginal cost of increasing repression. It is clear from equation (20) that we have an interior solution only if $f_0 > f > 0$. If the the terrorist is completely intolerant of repression, i.e., $f_0 = 0$, then the optimal choice of repression is $f = 0$. Our finding is similar to Rosendorff and Sandler (2004) in some respects. They find that if a government responds to terrorism with excessive force, it may increase grievances which can strengthen the terrorists by providing a larger base of supporters and may lead to more violent terrorist attacks.

6.1 Comparative Statics

In this section, we analyze how the choice of repression is affected by changes in the level of integration, the size of the minority, the tolerance for repression, the weight the government attaches to the payoff of the majority and the penalty associated with corruption.

Proposition 1: *When the penalty associated with corruption, is below (above) a certain threhold, a rise in the degree of integration a) decreases (increases) repression (f), and b) increases (decreases) the probability of an attack (p).*

Proof: a) Differentiating the first order condition given by equation (20) with respect to α, using the implicit function theorem, yields:

$$\frac{\partial f^*}{\partial \alpha} = \frac{N_{f\alpha}}{-D_{ff}}, \tag{21}$$

where

$$N_{f\alpha} = -\Delta \frac{F_0(f - f_0)}{2\theta_0(1-\beta)f_0} e^{\frac{-f}{f_0}} - \mu_m \lambda \gamma \frac{\partial d_m^*}{\partial \alpha}, \tag{22}$$

and for a sufficiently large $\Delta > 0$

$$\begin{aligned} D_{ff} =& -\Delta\alpha \frac{2f_0 - f}{f_0^2} \frac{F_0}{2\theta_0(1-\beta)} e^{\frac{-f}{f_0}} - \mu_m \lambda \gamma \frac{\partial d_m^*}{\partial f} - \varphi''(f), \\ &< 0. \end{aligned} \tag{23}$$

Further, note that $N_{f\alpha}$ is linear in F_0. Since $\frac{\partial d_m^*}{\partial \alpha} > 0$, $N_{f\alpha} < 0 \ \forall F_0 < \tilde{F}_0$ and $N_{f\alpha} > 0$ $\forall F_0 > \tilde{F}_0 \implies \frac{\partial f^*}{\partial \alpha} < 0 \ \forall F_0 < \tilde{F}_0$ and $\frac{\partial f^*}{\partial \alpha} > 0 \ \forall F_0 > \tilde{F}_0$ by the Intermediate Value Theorem ■

b) It is easy to verify that $\frac{\partial p}{\partial f^*} = x_0 + y_0 < 0$ which $\implies \frac{\partial p}{\partial f^*}\frac{\partial f^*}{\partial \alpha} > 0$ for all $F_0 < \tilde{F}_0$ and $\frac{\partial p}{\partial f^*}\frac{\partial f^*}{\partial \alpha} < 0$ for all $F_0 > \tilde{F}_0$■

Remark: *In equilibrium, the government chooses a level of repression such that the marginal reduction in the expected loss from a terrorist attack (marginal benefit of repression) is equal to the marginal cost of repression. Now consider, a rise in the level of integration, A rise in the level of integration increases the marginal cost of repression. To restore equilibrium, the marginal reduction in the loss from terrorism must increase as well. For any level of repression, a rise in integration affects the probability of an attack in two ways: first, it reduces the terrorist's effort; second, it also reduces the degree of corruption which further reduces the terrorist's effort. As a consequence, the probability of an attack decreases which implies that the marginal expected loss from terrorism decreases. Whether the marginal expected loss decreases sufficiently or not, in the net, depends on the magnitude of the penalty associated with corruption.*

If the penalty associated with corruption is sufficiently large then the decrease in marginal expected loss (marginal benefit of repression) is larger. As a result, to restore equilibrium, the marginal cost must increase. Hence, the government increases repression in equilibrium. As a direct consequence, the probability of an attack declines in equilibrium. However, if the penalty associated with corruption is not large enough, the argument is reversed and the government restores equilibrium by reducing the degree of repression thereby increasing the probability of an attack. Our result implies that countries that have high level of safeguards against corruption tend to be more repressive and experience a lower probability of attack. On the other hand, countries where the institutional framework against corruption is weak tend to be less repressive, ceteris paribus, and experience a greater probability of attack. Fearon and Laitin (2003) and Hegre and Sambanis (2006)

find that countries with lower GDP scores that endure high levels of corruption tend to experience more violent insurgencies which is somewhat similar to our finding.

Proposition 2: *An increase in the size of the immigrant minority increases(decreases) the level of repression and decreases (increases) the probability of an attack depending on whether the penalty associated with corruption is greater (lesser) than a certain threshold.*
Proof: Differentiating the first order condition given by equation (20) with respect to μ_m, using the implicit function theorem, yields:

$$\frac{\partial f^*}{\partial \mu_m} = \frac{N_{f\mu_m}}{-D_{ff}}, \tag{24}$$

where

$$N_{f\mu_m} = -\alpha\lambda\Delta_\nu^m \frac{F_0(f-f_0)}{2\theta_0(1-\beta)f_0} e^{\frac{-f}{f_0}} - \lambda\gamma d_m^*, \tag{25}$$

and $D_{ff} < 0$ given by equation (23). Since $f < f_0$ and $N_{f\mu_m}$ is linear in F_0, the result follows from the Intermediate Value Theorem. Further, since $\dfrac{\partial p}{\partial f*} < 0$, our result follows ■

Remark: *Recall that, in equilibrium, the government chooses a level of repression such that the marginal reduction in expected loss from terrorism (marginal benefit of repression) is equal to the marginal increase in the cost of repression. As the size of the minority increases, the marginal cost of repression increases, as a consequence, the marginal reduction in the expected loss from terrorism must increase. If the penalty associated with corruption is sufficiently large, the marginal reduction in expected loss from terrorism (marginal benefit of repression) is larger than the marginal cost of repression. As a result, the government increases repression in equilibrium which results in a lower probability of an attack. However, by the same token, if the penalty associated with corruption is not large enough, the government restores equilibrium by reducing the degree of repression. In that case the probability of an attack increases in equilibrium. Thus our model predicts that countries that harbor larger minorities should tend to experiences a lower probability*

of a terrorist attack if the degree of corruption is not too high. However, countries that are mired by greater levels of corruption will tend to experience a greater probability of an attack holding everything else constant.

Proposition 3: *An increase in the penalty associated with corruption increases repression and decreases the probability of an attack.*

Proof: Differentiating, equation (20) with respect to F_0, using the implicit function theorem, yields:

$$\frac{\partial f^*}{\partial F_0} = \frac{N_{fF_0}}{-D_{ff}}, \tag{26}$$

where

$$N_{fF_0} = -\Delta \frac{\alpha(f - f_0)}{2\theta_0(1-\beta)f_0} e^{\frac{-f}{f_0}} > 0 \tag{27}$$

Since $D_{ff} < 0$, our result follows ■

Remark: *A rise in the penalty associated with corruption increases the marginal reduction in the expected loss from terrorism (marginal benefit of repression). As a consequence, the marginal cost must increase as well. Hence, the government increases repression in the equilibrium.*

Proposition 4: *Repression increases and the probability of an attack decreases if the government's expected loss from terrorism is sufficiently large.*

Proof: Differentiating equation (20) with respect to Δ_G, using the implicit function theorem, yields:

$$\frac{\partial f^*}{\partial \Delta_G} = \frac{N_{f\Delta_G}}{-D_{ff}}, \tag{28}$$

where

$$\begin{aligned} N_{f\Delta_G} = & -\frac{\alpha F_0(f - f_0)}{2\theta_0(1-\beta)f_0} e^{\frac{-f}{f_0}} \\ & > 0 \end{aligned} \tag{29}$$

and $D_{ff} < 0$ as before.

Remark: *A rise in the magnitude of loss from the perspective of the government increases the marginal benefit of increasing repression. To restore equilibrium, the marginal cost must increase as well. As a result, the government increases repression in equilibrium.*

Proposition 5: *Repression increases and the probability of an attack decreases in response to an increase in the weight the government attaches to the pay off of the majority provided that the expected loss of the majority is greater than that of the minority. The exact opposite result is obtained if the expected of the loss of the minority community is larger provided that the fine associated with corruption is sufficiently large.*

Proof: Differentiating equation (20) with respect to λ, using the implicit function theorem, yields:

$$\frac{\partial f^*}{\partial \lambda} = \frac{N_{f\lambda}}{-D_{ff}}, \tag{30}$$

where

$$N_{f\lambda} = -\frac{\alpha F_0(f - f_0)}{2\theta_0(1-\beta)f_0} e^{\frac{-f}{f_0}} (\mu_m \Delta_m - \mu_M \Delta_M) - \mu_m \gamma d_m, \tag{31}$$

and $D_{ff} < 0$ as before. It is easy to note that if $(\mu_m \Delta_m - \mu_M \Delta_M) < 0$ then $N_{f\lambda} < 0 \Longrightarrow \frac{\partial f^*}{\partial \lambda} < 0$. However, if $\mu_m \Delta_m$ is sufficiently greater than $\mu_M \Delta_M$ then $N_{f\lambda} > 0 \implies \frac{\partial f^*}{\partial \lambda} > 0$ ■

Remark: *Consider the case where the government increases the weight it attaches on the payoff of the majority. If the loss from a terrorist attack of the majority is greater than that of the minority, the marginal benefit of repression increases. Since the marginal cost does not change. The government restores equilibrium by increasing repression on the minority. On the other hand, if the loss to the minority from terrorism is sufficiently larger than the majority, then the marginal benefit of repression decreases. As a consequence, the government reduces repression in that case.*

Proposition 6: *A rise in the tolerance for repression of the terrorist, increases the level of repression in equilibrium and reduces the probability of an attack.*

Proof: Differentiating equation (20) with respect to f_0, using the implicit function theorem yields:

$$\begin{aligned}\frac{\partial f^*}{\partial f_0} =& \Delta \frac{\alpha F_0}{2\theta_0(1-\beta)} e^{\frac{-f}{f_0}} \frac{f_0 - f}{f_0^3} + \Delta \frac{\alpha F_0}{2\theta_0(1-\beta)} e^{\frac{-f}{f_0}} \frac{f}{f_0^2}, \\ >& 0.\end{aligned} \tag{32}$$

Since $\dfrac{\partial p}{\partial f} < 0$, our result follows ■

Remark: *A rise in the level of tolerance for repression affects the equilibrium level of repression in two ways; First, as the terrorist becomes more tolerant of repression, the marginal benefit of terrorism decreases which prompts the terrorist to reduce effort. The fall in effort reduces the probability of an attack. Since, the probability of an attack falls, the law enforcement agency's marginal cost of corruption increases. As a result, the law enforcement agency decreases the equilibrium level of corruption. Both these effects increase the marginal benefit of increasing repression from the point of view of the government. As a consequence, the equilibrium level of repression rises which further reduces the probability of an attack.*

7 Conclusion

We analyze a model of counterterrorism in the context of a country that is comprised of a majority and an immigrant minority. The terrorist is assumed to represent and arise from the minority. Both communities commit resources to prevent the probability of an attack. The minority community's marginal utility from committing resource increases with the level of integration with the host country. The law enforcement agency can appropriate a fraction of the resources committed by both communities. The degree of appropriation depends on the cost and the penalty associated with corruption which are institutionally determined. Higher cost and larger penalties reduce corruption. The government uses repression on the minority population to trammel the threat of terrorism. A rise in the level

of repression also increases the marginal cost of the resource the minority may commit to defend from a terrorist attack. In this context, we find that greater integration may lead to more repression if the penalty associated with corruption is sufficiently large. In that case, greater integration also reduces the probability of an attack. However, greater integration tends to weaken repression but increase the probability of an attack if the penalty associated with corruption is sufficiently low. This finding implies that countries that have poor institutional frameworks to impede corruption should experience a greater probability of attack.

Similarly, we find that a larger minority leads to more repression and a lower probability of attack if the penalty associated with corruption is sufficiently large. We also find that the larger the expected loss the government suffers following an attack, the greater is the degree of repression that the government imposes on the minority. This implies that an incumbent expecting a political backlash in the wake of an attack will be more repressive. Finally, we find that an increase in the weight the government attaches on the pay-off of the majority increases repression but reduces the probability of an attack provided that the aggregate loss to the minority following a terrorist attack is smaller than that of the majority. However, an increase in the weight the government attaches on the majority reduces repression if the penalty for corruption is sufficiently large and the aggregate loss to the minority is larger. In that case the probability of an attack also increases. Finally, we find that the level of repression increases when the terrorist is more tolerant of repression.

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