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Who Is the Enemy?

Gil S. Epstein
Ira N. Gang

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Gil S. Epstein
Bar-Ilan University, CEPR and IZA Bonn

Ira N. Gang
Rutgers University and IZA Bonn

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
Email: iza@iza.org

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ABSTRACT

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We examine who benefits when there is a strong leader in place, and those who benefit when a situation lacks a proper leader. There are fractious terrorist groups who seek to serve the same people in common cause against a common enemy. The groups compete for rents obtained from the public by engaging in actions against the common enemy. We derive a condition under which the concerned parties, the terrorist groups and the local population upon whom the terrorist groups inflict their actions, benefit or lose in the two scenarios, and examine the consequences of counter-terrorist policy.

JEL Classification: D71, D72, D74

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Corresponding author:

Ira N. Gang
Economics Department NJH
Rutgers University
75 Hamilton St.
New Brunswick NJ 08901-1248
USA
Email: gang@economics.rutgers.edu

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Who is the Enemy?

1. Introduction

In conflicts around the world multiple factions compete for public support. These rivalries are typically characterized by having one highly structured side such as the government in power and another that is more of a confederation of independent groups, often whose sole commonality is the desire to oust the government. Except that they face a common enemy, these factions are natural rivals – struggling to ascend to power and lead their people, their own conflicts not fully played out until their common enemy is defeated. In the meantime, they compete by carrying out actions against the common enemy, more than against each other.

This framework can encompass a wide range of conflicts, including many civil wars and insurgencies. We examine conflicts characterized by terrorists/militants on one side, and a government on the other. Among others, the Israeli-Palestinian conflict fits the stylised facts we are modelling. There are many complicated facets of this dispute. Of particular interest here is the leadership of rivalrous Palestinian groups, an issue that has come to the foreground during the intifada that began in September 2000. Shakaki (2002), for example, discusses competition between the 'young guard' and the 'old guard' in the Palestinian Nationalist Movement, arguing much of the current uprising is the outcome of this dispute.[1] Bloom (2004) explains suicide bombings as competition among the groups for the support of the people and a claim to leadership.

In the realm of questions about the Israeli-Palestinian conflict, this competition raises a very interesting one: Who should lead the Palestinians, or, indeed, should they have a single leader? In politics and newspapers, this question has become "Is Arafat relevant?". Obviously for us the question is much more general, in what situations — and for whom — is an overall leader of the rebellious/insurgents/terrorists desirable, and in what circumstances – and for whom – is such a leader a detriment.

[1] The Economist magazine has returned to this theme several times. On March 13, 2004 ("Who's in charge" pp. 45-6) they trace the current rifts to the acceptance of the two-state solution of Oslo, which half of the 11 member Central Committee opposed. Berrebi (2004) provides a detailed description and analysis of these groups.

We construct a very simple, highly stylized model to examine who benefits when there is a strong leader in place, and those who benefit when the situation lacks a proper leader. There are fractious terrorist groups who seek to lead their people in common cause against a common enemy. Each group can be thought of as having its own head, but what we have in mind is a leader of such stature that he can set the rules for all groups, including how the gains from leadership are to be divided. We refer to this leader as the ruler. The ruler is also the head of one of the terrorist groups.[2]

What each terrorist group is after, and what the ruler is after, if one exists, is the hearts and minds of the "people." This rather ethereal goal is termed rent, and our model is one of rent-seeking by the terrorist groups. Key to our analysis of who captures the rents, and the consequences of rent-seeking for the common enemy, is the rule structure and how it differs when there is a ruler in place versus when there is not.

When there is a ruler he determines where the rents are to go; of course, he will decide that most of the rents will go to his group. This can be seen as a contest between the groups where the winner receives all the rents. We thus describe this as the all-pay auction contest where the group that inflicts the most against the enemy will receive (in the extreme case) all the rents. On the other hand, if there is no leader then the groups compete against each other and obtain rents relative to the amount of effort invested in this contest. This can be seen as a lottery contest where each group obtains rent proportional to the effort invested.

We want to determine the leadership structure under which a group would be better off, as well as the circumstance that the common enemy prefers. We are able to state simple and general conditions for each group and the common enemy to benefit. These conditions depend on the difference and variance of the benefits each of the groups can obtain from winning such a contest.

The next section first describes the model. It implements the lottery and all-pay decision rules in the context of the model, and compares the implications for each of the concerned parties. We then introduce counter-terrorism measures and examine their implications. A concluding section follows.

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[2] Bueno de Mesquita (2004) looks at the structure of terrorism by examining the government's choice of "partners" among terrorist groups. Siqueira (2004) also examines the interrelationships among factions.

2. The Model

Consider the case where there exist m "terrorist" groups. Each group has the same objective in terms of having the same common enemy and wanting to serve the same people, attracting rent by its actions against the common enemy. The rent can be thought of as recognition for taking part in changing history, determining how and what should be done, leading the "nation", and so on.[3]

Denote by n_i the maximum rent group i can extract from the public. It is not clear which of the groups has more to gain, namely if n_i is greater or smaller than n_j for all $j \neq i$. One can think of winning the contest in probabilistic terms. The probability that group i wins the contest and receives a rent of n_i is equal to Pr_i. The expected rent group i receives in this competition equals $Pr_i n_i$. One can also look at Pr_i as the proportion of the rent that this group receives in the competition. To simplify, we generally talk about proportions of the rent obtained and not probabilities of winning the contest, keeping in mind that the two are equivalent.[4]

We denote by x_i the amount of effort invested in trying to obtain the rent. The effort, x_i, can be seen as the number and/or intensity of terrorist attacks against the common enemy, as time invested by the group in public relations, or many other activities that show how devoted this group is to the cause and convince the public that they are *per se* the natural and rightful leaders. Expenditures invested by all interest groups, x_i, determine the proportion of the rent obtained (or the probability of winning the contest).

The expected net payoff (surplus) for the risk neutral interest groups is

$$E(w_i) = \Pr_i n_i - x_i \quad \forall\ i = 1, 2, ..., m. \tag{1}$$

[3] Religion may also play a role in the obtained rents. If the cause the terrorist groups are competing to lead is religious, then the more observant religious group may have a larger stake and be able to extract greater rents. However, even if the population they are seeking to serve is religious, the population may or may not believe the groups are responding to their religious cause; this doubt can lower the expected rent. Moreover, if one group is religious and another is not, the rents may not be identical 'items'. For simplicity, we leave the discussion of religion outside the domain of this paper.

[4] Although mathematically equivalent, they are conceptually distinct. In the two scenarios we present below, one naturally lends itself to a discussion in terms of the probability of winning the contest, while the intuition of the other is better when thinking about the proportion of the rent obtained.

For now we assume that the proportion of the rent obtained in the contest (or the probability of winning the contest) satisfies the following conditions:

a. The sum of the proportions of the rent obtained equals one, $\sum_{i=1}^{m} \Pr_i = 1$.

b. As a group *i* increases its effort, it obtains a higher proportion of the rent, $\frac{\partial \Pr_i}{\partial x_i} > 0$.

c. As interest group *j*, the opponent of group *i*, increases its effort, the proportion of the rent that group *i* obtains decreases, $\frac{\partial \Pr_i}{\partial x_j} < 0$.

d. The marginal increase in the proportion of the rent obtained from the contest decreases with investment in effort, $\frac{\partial^2 \Pr_i}{\partial x_i^{\,2}} < 0$ (this inequality ensures that the second order conditions for maximization are satisfied).[5]

e. To simplify, we do not discuss the possibility of free riding for the different groups. One could think of a situation under which the actions of one group positively affect the proportion obtained by the other group, as the people do not always know which of the groups was really responsible for the outcome. We over come this by assuming $\frac{\partial \Pr_i}{\partial x_i} > 0$ and $\sum_{i=1}^{m} \Pr_i = 1$.

The players engage in a contest and we assume a Nash equilibrium outcome. Each group determines the level of its activities x_i so that its expected payoff, $E(w_i)$ $\forall\, i = 1,2,..,m$, is maximized. The first order condition for maximization is given by

(2)
$$\frac{\partial E(w_i)}{\partial x_i} = \frac{\partial \Pr_i}{\partial x_i} n_i - 1 = 0_i \quad .$$

Equation (2) is satisfied if and only if

[5] The function $\Pr_i(.)$ is usually referred to as a contest success function (CSF). The functional forms of the CSF's commonly assumed in the literature satisfy these assumptions (see Nitzan, 1994).

(3) $$\frac{\partial \Pr_i}{\partial x_i} = \frac{1}{n_i} \quad .$$

Thus, given that the proportion has decreasing marginal utility with respect to the level of effort invested, *the group with the higher stake in the contest will invest more effort in the contest.* For example, if group 1 has the higher stake/benefit in the contest compared to group 2, $n_1 > n_2$, then group 1 will determine its effort, x_1, such that the marginal proportions are $\frac{\partial \Pr_1}{\partial x_1} < \frac{\partial \Pr_2}{\partial x_2}$, in order to increase its proportion of the rent. The group that has a higher benefit from winning the contest will invest the highest amount of effort: more propaganda, more effort in convincing its people, more terrorist attacks, and so on.

To simplify and without loss of generality assume that:

(4) $$n_1 \geq n_2 > n_3 \geq ... \geq n_m$$

This assumption simply states that there are two groups that have higher stakes than all the rest of the groups.

2.1 The Ruler Takes All

We now describe the situation where there is a recognized ruler who commands the allegiance of the terrorist groups. Generally, the ruler is the head of one of the terrorist groups. However, his status amongst the people is such that he is able to set the "rules of the game" that all groups must follow. We assume the extreme situation that all rents accrue to the ruler, though it could well be that the ruler gives the other group part of the rent. Therefore, we look at the rents as the net rents after one group gives the other a small portion.

In the all-pay auction the probability of winning[6] is

[6] Under this scenario thinking in terms of the probability of winning the contest enhances our intuition.

$$
(5) \qquad \Pr_i = \begin{cases} 1 & if \quad x_i > x_j \; \forall i \neq j \\ \dfrac{1}{k} & if \;\; i \; ties \; for \, the \; high \, bid \; with \; k-1 \, others \\ 0 & if \quad x_j > x_i \; \forall i \neq j \end{cases}
$$

It can be verified that there exists a unique symmetric Nash equilibrium as well as a continuum of asymmetric Nash equilibria. In any equilibrium, groups 3 through *m* invest zero effort in terrorist activities with probability one (see Baye, Kovenock, and de Vries, 1996), so that *only the two groups that have the highest rents will participate.*

We conduct our analysis for two terrorist groups, Groups 1 and 2. Without loss of generality, assume that $n_1 > n_2$; thus interest group 1 has greater gain from winning the contest. It is clear, therefore, that terrorist group 1 is able to bid more than group 2.[7] However, it is not clear how much each will bid in equilibrium. It is a standard result that there are no pure strategy equilibria in all-pay auctions (Hillman and Riley (1989), Ellingsen (1991) and Baye, Kovenock and de Vries (1993, 1996)).[8] Based on these studies, we can obtain equilibrium expected expenditures, equilibrium probabilities and expected payoffs.

In the case of only two groups the probability of winning becomes

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[7] The bids consist of the quantity/quality of actions against the common enemy.

[8] It is a standard result that there is no equilibrium in pure strategies in all-pay auctions. Suppose group 2 bids $0 < x_2 \leq n_2$. Then the first groups optimal response is $x_1 = x_2 + \varepsilon < n_1$ (i.e., marginally higher than x_2). But then $x_2 > 0$ cannot be an optimal response to $x_1 = x_2 + \varepsilon$. Also, it is obvious that $x_1 = x_2 = 0$ cannot be an equilibrium. Hence, there is no equilibrium in pure strategies. There is a unique equilibrium in mixed strategies given by the following cumulative distribution functions (see Hillman and Riley (1989), Ellingsen (1991) and Baye, Kovenock, and de Vries, 1996)):

$G_1(x_1) = \dfrac{x_1}{n_2}$ *for* $x_1 \in [0, n_2)$ and $G_2(x_2) = 1 - \dfrac{n_2}{n_1} + \dfrac{x_2}{n_1}$ *for* $x_2 \in [0, n_2)$.

The equilibrium c.d.f's show that group 1 bids uniformly on [0, n_2], while group 2 puts a probability mass equal to $(1 - n_2 / n_1)$ on $x_2 = 0$. The expected lobbying expenditures are

$E(x_1) = \int_0^{n_2} x_1 dG_1(x_1) = \dfrac{n_2}{2}$ *and* $E(x_2) = \int_0^{n_1} x_2 dG_2(x_2) = \dfrac{n_2^{\,2}}{2n_1}$. Note that in the all-pay auction we can think of the designation "leader" as probabilistic - i.e., the stronger player is more likely to win the contest.

(6) $$\Pr_i = \begin{cases} 1 & if \quad x_i > x_j \\ 0.5 & if \quad x_i = x_j \\ 0 & if \quad x_j > x_i \end{cases}$$

The expected activity level for each group is

(7) $$E\left(x_1^*\right) = \frac{n_2}{2} \quad and \quad E\left(x_2^*\right) = \frac{n_2^2}{2n_1} \quad .$$

The equilibrium probability of winning the contest for each group equals

(8) $$\Pr_1^* = \frac{2n_1 - n_2}{2\,n_1} \quad and \quad \Pr_2^* = \frac{n_2}{2\,n_1} \quad .$$

The expected equilibrium payoff for each group equals

(9) $$E\left(w_1^*\right) = n_1 - n_2 \quad and \quad E\left(w_2^*\right) = 0 \quad .$$

In equilibrium, the total amount of terrorist activities carried out by the groups' equals

(10) $$E\left(X^*\right) = E\left(x_i^* + x_j^*\right) = \frac{n_2^2 + n_2 n_1}{2\,n_1} = \frac{n_2\left(n_2 + n_1\right)}{2\,n_1} \quad .$$

Notice that if both groups can obtain the same benefit, $n_1=n_2=n$, the expenditure of each group is $E\left(x_1^*\right) = \frac{n}{2}$ *and* $E\left(x_2^*\right) = \frac{n}{2}$; the probability of winning for each equals one-half, $\Pr_1^* = \Pr_2^* = \frac{1}{2}$; the expected payoff for each group is zero, $E\left(w_1^*\right) = E\left(w_2^*\right) = 0$; and the total effort invested in terrorist attacks equals $X^* = n$.

2.2 The Law of the Jungle

Here we consider the case where the terrorist groups compete with one another in a contest in which there is no single leader to whom both groups turn. In the general case there are m groups competing against one another. We are interested in comparing two extreme cases with each other: *the ruler takes all* with *the law of the jungle*. In the ruler takes all case we saw that only the two groups with the highest rents from the contest will compete. In the case we will discuss now, the number of groups competing has a strong effect on the expected payoffs and on the total amount of resources invested in activities against the common enemy. It can be shown that as the number of contestants increases both the expected amount of resources invested in the conflict and the expected payoffs may increase or decrease. This will depend on the relative levels of the rents and the number of groups competing (Baye, Kovenock, and de Vries, 1993, Che, and Gale, 1998 and Epstein and Nitzan, 2002, 2004). As a result of this, and as we wish to compare our results in this type of situation to the one presented above, we restrict our analysis to two terrorist groups.

As we discussed in the introduction, in this scenario there is no ruler determining the "terms of the game". Without a ruler each group will fight to obtain its maximum possible portion. We assume that the contest is characterized by the generalized lottery function (Lockard and Tullock, 2001), $\Pr_i = \frac{x_i^r}{x_j^r + x_i^r} \;\; for \;\; r \le 2$. The return to effort in this lottery function is captured by the parameter *r*. When *r* approaches infinity the generalized lottery function becomes the all-pay auction under which the terrorist group that invests in the highest level of activities wins the contest (see Baye, Kovenock and de Vries, 1993, 1996). The idea behind this is that the player with the higher stake has a weight of infinity and thus will win with probability one and the group with the lower stake will lose with probability 1.

For now we assume that *r* is known and fixed and $r \le 2$. The expected net payoff (surplus) for the risk neutral terrorist group is thus given by

(11) $$E(w_i) = \frac{x_i^r}{x_i^r + x_j^r} n_i - x_i \quad \forall\, i = 1,2 .$$

The first order condition, as stated in equation (2), that ensures that the terrorist group maximizes its expected payoff is given by

(12) $$\frac{\partial E(w_i)}{\partial x_i} = \frac{r x_i^{r-1} x_j^r}{\left(x_i^r + x_j^r\right)^2} n_i - 1 = 0 \quad \forall\, i, j = 1,2 \;\; i \ne j .$$

Denote by $x_i^* \quad \forall\, i, j = 1, 2 \;\; i \neq j$ the Nash equilibrium outcome of the contest. Solving (12) for both terrorist groups using a Nash equilibrium, we obtain that the level of activities each group participates in equals[9]

$$(13) \qquad x_i^* = \frac{r\, n_i^{r+1} n_j^r}{\left(n_i^r + n_j^r\right)^2} \quad \forall\, i, j = 1, 2 \;\; i \neq j .$$

Therefore, the Nash equilibrium proportion of the rents obtained in the contest[10] equals

$$(14) \qquad \Pr_i^* = \frac{n_i^r}{n_i^r + n_j^r} \quad \forall\, i, j = 1, 2 \;\; i \neq j .$$

The expected equilibrium payoff for each group equals

$$(15) \quad E\left(w_i^*\right) = \frac{n_i^r}{n_i^r + n_j^r}\, n_i - \frac{r\, n_i^{r+1} n_j^r}{\left(n_i^r + n_j^r\right)^2} = \frac{n_i^{2r+1} - (r-1)\, n_i^{r+1} n_j^r}{\left(n_i^r + n_j^r\right)^2} \quad \forall\, i, j = 1, 2,\;\; i \neq j,\; r < 2.$$

And finally, we can calculate the total amount of effort invested in the contest by the two groups. In the literature this measure is called rent dissipation. In our contest it tells us how much effort the terrorist groups inflict against the common enemy. We denote this total effort in equilibrium by X^*:

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[9] We obtain from the first order conditions (equation (12)) that $\forall\, i, j = 1, 2 \;\; i \neq j$, $\frac{r x_i^{r-1} x_j^r}{\left(x_i^r + x_j^r\right)^2} n_i = 1$, therefore it holds that $\frac{r x_1^{r-1} x_2^r}{\left(x_1^r + x_2^r\right)^2} n_1 = 1$ and $\frac{r x_2^{r-1} x_1^r}{\left(x_1^r + x_2^r\right)^2} n_2 = 1$. Using these two equations we obtain that $\frac{x_2}{x_1}\frac{n_1}{n_2} = 1$ and thus $x_2 = x_1 \frac{n_2}{n_1}$.

Substituting x_2 ($x_2 = x_1 \frac{n_2}{n_1}$) into $\frac{r x_1^{r-1} x_2^r}{\left(x_1^r + x_2^r\right)^2} n_1 = 1$ we obtain that $x_1^* = \frac{r\, n_1^{r+1} n_2^r}{\left(n_1^r + n_2^r\right)^2}$. In a similar way we calculate the optimal level of x_2.

[10] Under this scenario our intuition is enhanced by thinking in terms of the proportion of the rents obtained from the contest.

(16) $$X^{*} = x_i^{*} + x_j^{*} = \frac{r\ n_i^r n_j^r \left(n_i + n_j\right)}{\left(n_i^r + n_j^r\right)^2} \quad \forall\ i, j = 1,2\ \ i \neq j\ .$$

In the case where the terrorist groups are symmetric, i.e., $n_1=n_2=n$, we would obtain the following: the level of activities of each group equals $x_i^{*} = n\frac{r}{4} \quad \forall\ i, j=1,2\ \ i \neq j$ (remember that r is less than or equal to 2 and therefore the total expenditure will be at the maximum when $x_i^{*} = \frac{n_i}{2}$); the Nash equilibrium proportion of the rents obtained from the contest will be equal to one-half, $\Pr_i^{*} = \frac{1}{2}$; the expected equilibrium payoff to each group equals $\frac{(2-r)\,n}{4}$ (once again, remember that r is less than or equal to 2),[11] and finally the total effort in equilibrium equals $X^{*} = \frac{r\ n}{2}$.[12]

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[11] For r > 2 the equilibrium differs from this one as it is based on mixed and not pure strategies. This is the case in the all pay auction that we previously described.

[12] Let us consider how changes in r affect the expected equilibrium payoff $E\left(w_i^{*}\right) = \frac{n_i^r}{n_i^r + n_j^r}\ n_i - \frac{r\ n_i^{r+1} n_j^r}{\left(n_i^r + n_j^r\right)^2} = \frac{n_i^{2r+1} - (r-1)\ n_i^{r+1} n_j^r}{\left(n_i^r + n_j^r\right)^2} \quad \forall\ i, j = 1,2,\ \ i \neq j,\ r < 2.$ and the total effort in equilibrium by $X^{*} = x_i^{*} + x_j^{*} = \frac{r\ n_i^r n_j^r \left(n_i + n_j\right)}{\left(n_i^r + n_j^r\right)^2} \quad \forall\ i, j = 1,2\ \ i \neq j$. To simplify our calculations denote by a the relative rent of the second group in relationship to that of the first group's rent: $a = \frac{n_2}{n_1}$. Given a we recalculate the expected payoff and total effort in equilibrium as

$$E\left(w_i^{*}\right) = \frac{n_i\left(1 - (r-1)\ a^r\right)}{\left(1 + a^r\right)^2} \quad and\ \ X^{*} = \frac{r\ n a^r (1+a)}{\left(1 + a^r\right)^2} \quad \forall\ a = \frac{a_j}{a_i},\ i = 1,2,\ \ r < 2\ \cdot$$

2.3 Comparing Terrorist Activities Under Both Situations

We now wish to compare these two types of contests both from the perspective of the terrorist groups and the population that the terrorist groups act against. The common enemy is concerned with the level (the quantity and intensity) of terrorism, preferring the minimum level of attacks. X^* gives the total activity of the terrorists in equilibrium.

Under the generalized lottery function, $\Pr_i = \frac{x_i{}^r}{x_j{}^r + x_i{}^r}$ *for* $r \le 2$, from (16) we obtain that the total amount of activities carried out is equal to $X_L{}^* = x_i^* + x_j^* = \frac{r\, n_i^r n_j^r (n_i + n_j)}{(n_i^r + n_j^r)^2} \quad \forall\, i, j = 1,2 \;\; i \ne j$. In order to simplify our analysis let us assume that *r = 1* (remember that the values that *r* can take on in this case are between two and zero). Under the all-pay auction, from equation (10) we obtain that the total investment into terrorist activities is equal to $E(X_p{}^*) = \frac{n_2\,(n_2 + n_1)}{2\,n_1}$.

The total amount of expenditure invested in the contest and inflicted against the

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where,

$$\frac{\partial E(w_i^*)}{\partial r} = \frac{n_i\left(1 + a^{2r}\left(1 + \left(r - r^2\right)Ln(a)\right) + r\,a^r\left(2 + \left(r^2 - 3\right)Ln(a)\right)\right)}{\left(1 + a^r\right)^2}$$

$$and \qquad \frac{\partial X^*}{\partial r} = \frac{n\,a^r(1+a)(1 + rLn(a) + a^r(1 - rLn(a)))}{(1 + a^r)^3}.$$

As we can see from the above, the effect of a change in the parameter *r* has an ambiguous affect on the expected payoff and expenditure of the groups. For example, without loss of generality assume that *a* < 1. Since Ln(*a*) < 0 then for $1 < r < \sqrt{3}$, $\frac{\partial E(w_i^*)}{\partial r} > 0$ and for a = 1, $\frac{\partial E(w_i^*)}{\partial r} > 0$ and $\frac{\partial X^*}{\partial r} > 0$ .for r<1 $\frac{\partial X^*}{\partial r} > 0$.

terrorists' common enemy is higher under the generalized lottery function than under the all-pay auction regime if

(17) $$X_L^* = \frac{n_2 n_1}{n_1 + n_2} > \frac{n_2 (n_2 + n_1)}{2 n_1} = E(X_p^*) \ .$$

Equation (17) holds if and only if

(18) $$n_1^2 - 2 n_1 n_2 - n_2 > 0 .$$

From (18) we may conclude that the total amount of expenditure invested in the contest and inflicted against the terrorists' common enemy is higher under the generalized lottery function rather than under the all-pay auction regime if

(19) $$n_1 > n_2 \left(1 + \sqrt{2}\right).$$

Since, by assumption, $n_1 \geq n_2$, the result tells us that in order for the lottery contest to be worse for the population against whom the groups inflict their terrorist actions, the rent that one of the groups can obtain from such actions must be larger than the other group's rent (more than twice as large). We summarize this result in the following proposition:

If the variance of rents that can be generated from inflicting terrorist attacks against the common enemy is sufficiently large, i.e., $\frac{n_1}{n_2} > 1 + \sqrt{2}$*, then the common enemy prefers that the contest be an all-pay auction where the group that inflicts the most wins the contest. If each group has the same stake, i.e.,* $n_1 = n_2$*, then the common enemy prefers the law of the jungle.*

In order to analyze the preferences of the terrorist groups we must compare their expected payoffs under both the generalized lottery function and the all-pay auction regime. Remember that we assumed, without loss of generality, that group 1 has at least as large a stake as the second group $(n_1 \geq n_2)$. The terrorist groups prefer the regime that generates for them the maximum expected equilibrium payoff, $E(w_i^*)$. Under the generalized lottery function, and again assuming *r = 1*, the expected equilibrium payoff for group 2 (the weaker player) equals $E(w_2^*) = \frac{n_2^{\,3}}{\left(n_1 + n_2\right)^2}$, while the expected equilibrium under the all-pay auction equals zero,

$E\left(w_2^*\right)=0$. Therefore it is clear that,

The weaker terrorist group, the group that has less to gain from terrorist acts, will always prefer that there is no ruler.

For the stronger terrorist group the expected equilibrium payoff under the generalized lottery function equals $E_L\left(w_1^*\right)=\dfrac{n_1{}^3}{\left(n_1+n_2\right)^2}$, while the expected equilibrium under the all-pay auction equals $E_P\left(w_1^*\right)=n_1-n_2$. The expected payoff for group 1 under the generalized lottery regime is greater than that obtained under the all-pay auction regime and thus this terrorist group prefers the lottery regime if

(20) $$E_L\left(w_1^*\right)=\frac{n_1{}^3}{\left(n_1+n_2\right)^2} \quad > \quad n_1-n_2 \;=\; E_P\left(w_1^*\right)$$

Equation (20) holds if and only if

(21) $$n_1^2-2n_1\,n_2-n_2<0.$$

From equation (21) we may conclude that the expected payoff in the contest and the damage inflicted against the terrorists' common enemy is higher under the generalized lottery function rather than under the all-pay auction regime if

(22) $$0<\;n_1\;<n_2\left(1+\sqrt{2}\right).$$

In other words,

The terrorist group with the higher stake, with more to gain from the terrorist attacks, prefers the jungle law to a ruler if the difference between the groups is not sufficiently large, $\dfrac{n_1}{n_2}<1+\sqrt{2}$.

Note that the interests of the common enemy and the largest terrorist group always align.

3. Common Enemy Retaliation Against the Terrorist Groups

We now examine what happens when the common enemy invests effort in counter-terrorism measures in order to decrease the number and intensity of attacks. The common enemy undertakes both defensive and preemptive actions that may include surveillance, intelligence, and so on. Denote by *y* the resources invested by the common enemy.[13] We assume that *y* affects the size of n_i, the stakes of each group and thus the expected rent of the groups, where the expected rent is a function of the common enemies' level of investment. Denote by *n'* the stake after the investment by the common enemy: $n_i' = q(y)n_i \ \ for \ \ 0 < q(y) \le 1 \ \ and \ \ \frac{\partial q(y)}{\partial y} < 0$. In this case,

(23) $$E(w_i) = \Pr_i n_i' - x_i = \Pr_i q(y)n_i - x_i \ .$$

The common enemy invests its optimal level of *y* in order to prevent terrorist activity. Assume that for *y*=0 it holds that

(24) $$X_L^{\ *} = \frac{n_2 n_1}{n_1 + n_2} > \frac{n_2\,(n_2 + n_1)}{2n_1} = E(X_p^{\ *}) \ .$$

It is clear that $y_L^* > y_p^*$, namely, the investment of the common enemy under the law of the jungle will be higher than the ruler takes all. Denote by $n'_{1L}, n'_{2L}, n'_{1P}$ *and* n'_{2P} the stakes after the investment of the common enemy. Given (24), $y_L > y_p$, $n'_{1L} < n'_{1P}$ *and* $n'_{2L} < n'_{2P}$.

The common enemy must determine how much effort to invest in counter-terrorist measures. Since it will only invest effort to decrease terrorist activities, we consider the case where *X*, total terrorist activities, is a negative function of the level of *y.*[14] We look at the reduced form of the utility of the common enemy, $U_{ce}(.)$,

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[13] We do not distinguish between different types of actions by the common enemy, nor do we allow *y* to be more effective in influencing the behavior of one group over the other. For the importance of distinguishing the type of counter-terrorist actions in other models, see Arce and Sandler (2004), Faria (2004), and Rosendorff and Sandler (2004).

[14] It may well be the case that by not proportionately decreasing the two groups' rents, the total level of activities of the groups will increase. As stated above, it can be shown that as the size of the rents increases both the expected amount of resources invested in the conflict and the expected payoffs may increase or decrease. We consider here only the situation where the investment of the common enemy will decrease the amount of activities of the groups. In the case the opposite would hold the common enemy would not invest resources if fighting the terrorists.

(25) $$U_{ce}(.) = f\left(X\left(y\right)\right) - y\,,$$

where *f(.)*, is the effect of terrorism on the local population (the common enemy) and is increasing in *X*, and investment of *y* by the common enemy affects both terrorist groups and decreases the level of *X*. The common enemy will determine the level of *X* such that $U_{ce}(.)$ is maximized. The first order conditions are given by:

(26) $$\frac{\partial U_{ce}(.)}{\partial y} = \frac{\partial f\left(X\left(y\right)\right)}{\partial X}\frac{\partial X}{\partial y} - 1 = 0\,.$$

Remember that $\frac{\partial f\left(X\left(y\right)\right)}{\partial X} < 0$ *and* $\frac{\partial X}{\partial y} < 0$. The first order conditions are satisfied if the following holds,

(27) $$\frac{\partial X}{\partial y} = \frac{1}{\frac{\partial f\left(X\left(y\right)\right)}{\partial X}}\,.$$

Hence, as *X* increases, *y* also increases. We conclude from this that when comparing the two regimes, the one that has a higher level of *X* will have a higher level of *y*, however, in equilibrium after the investment of *y*, the order between the two regimes will hold. If *X* under the ruler takes all is higher than *X* under the law of the jungle, this will still be so even after the investment of *y*. However, $X_L^* - X_p^*$ may decrease.[15]

Given these counter-terrorism measures, we now return to the level of activities of the groups. As a result of the first order condition stated in (27) it will hold that

(28) $$X_L^*\left(y_L\right) = \frac{n_{2L}'n_{1L}'}{n_{1L}'+n_{2L}'} > \frac{n_{2P}'\left(n_{2P}'+n_{1P}'\right)}{2n_{1P}'} = E\left(X_p^*\left(y_P\right)\right)$$

Therefore, we conclude here that the investment of resources in counter-terrorism measures by the common enemy will not affect their own preferences with regard to the ordering of the ruler take all and the law of the jungle regimes. It is clear that in this case the common enemy invests more resources as *X* increases.

Now let us consider whether counter-terrorist measures change the preferences of the terrorist groups. The question is whether inequality (20) is still true under counter-terrorism:

[15] See Lee and Sandler (1989) for a detailed analysis of optimal retaliatory measures against terrorist. Also see Lapan and Sandler (1993).

(29) $$E_L\left(w_1^*\left(y_L\right)\right)=\frac{n'^3_{1L}}{\left(n'_{1L}+n'_{2L}\right)^2}>n'_{1p}-n'_{2p}=E_p\left(w_1^*\left(y_p\right)\right).$$

We cannot say if this inequality will still hold. It may well be the case that $n'_{1p}-n'_{2p}$ will decrease such that the inequality will change signs. This will happen only if the effect of a change on the first rent n_1 is stronger than that of the second rent.

Finally, if the common enemy could influence the choice of regime and the relative size of the groups, its preference is for the asymmetrically sized terrorist groups with an all-pay-auction (ruler). This is the situation that minimizes terrorist attacks.

4. Conclusion

The picture that is often placed before us is the choice between a ruler and chaos. If a ruler is removed, there is often strong support for quickly finding another ruler in order to avoid chaos. Alternatively, it is sometimes suggested that a situation will improve, if only the ruler goes away. In a highly structured and simple model we characterize and compare two ex ante regimes: (1) the lack of a recognized ruler as one in which the rent allocation rule is a lottery and each group obtains a proportion of their possible rent; (2) the presence of a dominant ruler as an all-pay auction in which the winner takes all available rents. In the later regime all groups follow the orders of the ruler, orders that restrict the contest allocations undertaken by the competing groups. But since the equilibrium here is in mixed strategies, the "stronger" player could actually lose the contest and get nothing. However, the expected payoff for the weaker terrorist group is zero.

The contests we address are the fractious relationships among terrorist groups seeking to lead their same public in a common cause against a common enemy. We are able to derive a very specific condition allowing us to see when each of the concerned parties wins and loses in their rent-seeking contests. If the difference between the groups in terms of the rewards they can obtain from the terrorist attacks is not sufficiently large, all parties – the two terrorist groups and their common enemy – prefer the lottery regime (law of the jungle) to an all-pay auction (ruler). However, if the difference between the groups in terms of the rewards that can obtained from the terrorist attacks is sufficiently large, then the group with the low benefit, group 2, prefers the lottery regime while the other terrorist group and the common enemy prefer the all-pay auction.

Thus, we might see "cooperation" between the common enemy and the largest terrorist group, for example, in actions to keep the smaller group from causing too much trouble. However, if circumstances change and the smaller group grows sufficiently large to challenge the larger group, we would expect to see an abandonment of attempts at cooperation by all parties.[16] And in the larger group, we would expect to see internal dissention as they work to displace their leader – the former overall ruler – who it is no longer in their best interest to keep.

One example of the behavior discussed in this paper lies in the Israeli-Palestinian conflict. Think about the larger group being Fatah and the smaller group being Hamas. When Fatah was very large relative to Hamas, Israel and Fatah want an Arafat. As Hamas grows, Israel wants less of Arafat and Fatah wants less of Arafat (Arafat is "irrelevant" and faces internal conflicts over leadership). With Fatah and Hamas relatively close in size, Israel is better off with the law of the jungle. This is also what both Fatah and Hamas want. Thus Israel and Fatah interests always line up, while Hamas never wants an Arafat.

If Israel is better off without an Arafat, they can be expected to marginalize him, conduct campaign of disinformation, and generally ignore him. It is in the interest of Hamas to always do so, and if Hamas and Fatah are near in size, this is also the interest of Fatah itself. Alternatively it may be in Israel's interest, as well as Fatah's, to maintain a ruler-world. In this case we could expect Israel and Fatah to take steps to weaken Hamas as a challenger and to strengthen Arafat, or some other leader. This, indeed, is Israel's best strategy, in the confines of our model. Depending on what happens to its rents as a result of Israel's counter-terrorist policies, it may also be Fatah's best strategy.

We conclude by pointing out that our approach and analysis goes beyond a standard rent-seeking contest, instead offering new theoretical insights for terrorism when there are competing groups. Aside from the insights we are able to provide about the struggle for leadership and control, our work is further distinguished by accounting for: (*i*) the possibility of counter-terrorist activities that can change the terrorists ordering of the regimes, and (*ii*) common enemy suffering based on terrorist regimes – i.e., ruler versus competition.

[16] See the insights on this issue offered by Bueno de Mesquita (2004).

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