Identity and Terrorism

by

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Abstract

We argue that the sense of identity is a prime motivator of terrorist activities and investigate its implications for defence against terrorism. Our framework models the decentralized terrorism (not sponsored by any state) that is characteristic of contemporary reality. Terrorist responses to perceived affronts to identity increase with the intensity of spite towards out-groups and altruism towards in-groups. We show that, while the intensity of terrorist actions is magnified by in-group altruism, it is out-group spite that is the more essential feature of identity that is pertinent to decentralized terrorism. Altruism towards in-group members, however, plays an important role in overcoming the potential free-riding of terrorists, making individual terrorist activities possible without coordination—despite the fact that such activities are of a public good nature from the terrorists' viewpoint. We show that the cost of ignoring identity considerations of terrorists can be considerable to countries defending against terrorism. When social identity is taken into account, we show that some actions that are espoused in the literature as being optimal for a country in conflict for economic or geopolitical reasons lack credibility (in the sense of Schelling, 1960).

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"Maybe people don't kill and die simply for a cause. They do it for friends—campmates, schoolmates, workmates, soccer buddies, bodybuilding buddies, paintball partners—action pals who share a cause. Maybe they die for dreams of jihad—of justice and glory—*and* devotion to a family-like group of friends and mentors who act and care for one another, of 'imagined kin', like the Marines."

— Scott Atran, *Talking to the Enemy: Faith, Brotherhood, and the (Un)Making of Terrorists*, p. 13 (emphasis in the original)

1 Introduction

This paper offers a theory of how the concept of identity contributes to the motivation of individuals to become terrorists and determines the allocation of their effort. We construct and analyze an economic model in which self-selecting terrorists operate in a decentralized manner, and where a root cause of terrorism is the undermining of the sense of identity.[1] The theory we propose has the promise of making sense of many empirically established facts. Our framework explains why terrorists may make sacrifices that are very costly to themselves and clarifies what the target countries stand to lose by ignoring the social identity of potential terrorists. Our approach also offers insights for policy implications for minimizing terrorism.

We base our model on empirically established psychological traits. The concept of identity we invoke is the answer to the question, "Who do I take myself to be?" Self-concept is an important notion in the social psychology literature (Tajfel and Turner, 1979; Tajfel, 1982; Brewer, 1999). This concept operates at the egoistic, social, and cultural levels. The latter two contribute to a sense of who is deemed to belong to 'Us' (the in-group) and who belongs to 'Them' (the out-group). The literature on the psychology of conflict reveals that, when groups of individuals with distinct identities

[1]The role of identity is a potentially important but neglected aspect of terrorism. At the level of formal analysis, we are aware only of one paper, Sambanis and Shayo (2013), that incorporates identity into analysis of conflict. But the focus there is on ethnic conflict, not terrorism.

confront each other, the incidence of in-group biases in decision-making increases significantly (Brewer, 1999). Social psychological analysts have argued that the different levels of identity that people embrace may interact to generate motivation for terrorism (Arena and Arrigo, 2005; Hogg and Reid, 2006; Schwartz et al., 2009). The salience of identity to conflict is also revealed in recent experiments performed with Palestinians and Jews in the West Bank; it is seen that a perceived offense to identity cannot be compensated for by money (Ginges et al., 2007).

Approaches that ignore the fundamental importance of identity greatly underestimate the potential costs of conflict. For example, if foreign occupation of land is perceived not merely as an illegitimate appropriation of alienable property but also an assault on identity,[2] the willingness to commit resources to resistance will be far greater than otherwise. Not only will defence be more strenuous than expected but retaliation will also be more vigorous. Better outcomes for all parties may be achieved by accounting for the core aspect of identity.

In the field of economics, identity considerations are relatively recent, pioneered by Akerlof and Kranton (2000, 2010). Recent work by Eswaran and Neary (2013, 2014) has demonstrated how evolution might hardwire a sense of proprietary rights that simulates a sense of self (identity). It is the premise of this paper that this sense of identity is a prime mover in terrorist activities. Among the determinants of the identity of individuals, the land and culture in which they were raised are important ones. Our reading of the literature on terrorism leads us to the view that a prime cause of terrorism is perceived damage done to the sense of identity of a group of individuals.[3]

[2]Pape (2006) and Pape and Feldman (2010) demonstrate that (suicide) terrorism is closely associated with foreign occupation. Since attachment to the country to which one belongs is an important component of one's identity, our focus on identity fits well with Pape's hypothesis.

[3]For example, the most serious terrorist attack in Canada to data was the Kanishka tragedy in which Air India Flight 182 was blown up in 1985 off the coast of Ireland, killing all 329 people on board. This was very directly the result of Sikhs in Canada perceiving their identity assaulted by the

In our analysis of terrorism, we begin with well-established, universal preferences in all humans that clearly dictate a distinction between 'Us' and 'Them'. These preferences have been rigorously demonstrated recently in an evolutionary context by Eaton et al. (2011) and by Konrad and Morath (2012). They capture the strong sense of identity with which all of us are innately endowed. This Us/Them dichotomy is consistent with a simplified version of the social psychological view of identity which we outline in the next section of the paper. A conflict with foreigners, deemed to be 'Them', simultaneously summons a sense of solidarity and therefore altruism towards those deemed 'Us' and generates a feeling of hostility or malevolence towards 'Them'. The intensity of these entwined responses that are generated by the perception of an assault on identity will vary across the population; terrorists will come from the more intense end of the spectrum.

Any damage inflicted on 'Them', for example in retribution for a perceived aggression, will be motivated not only by the direct personal satisfaction it generates for the actor, but also by the gratification it offers *all* members of the group who are deemed 'Us'. Even a slight degree of altruism towards fellow citizens could then generate exceptional sacrifices that could not be rationali zed on the basis of individual cost-benefit calculations. The presence of altruism amongst terrorists is well-documented (see, for example, Pape, 2006, Ch. 9; Atran, 2010). Pape has persuasively argued that much of suicide terrorism is driven by altruistic motives.[4]

While our paper is concerned with terrorism in general and not explicitly with suicide terrorism, altruism plays a key role. Leaders and members of terrorist groups may be respected in their communities as patriots, and are usually not viewed as self-serving

Indian government's attack on the Golden Temple in Punjab, India.

[4]In his view, of the three kinds of suicide Durkheim (1897/2006) identified, namely, egoistic, altruistic, and fatalistic, it is the middle one that is most relevant to suicide terrorism.

criminals or psychopathic deviants as their opponents often paint them. Resistance or freedom fighting is very much a public service and must therefore contain altruistic motives, though only towards a well defined in-group. In this paper, we incorporate altruistic motives by terrorists and examine their not-so-benign consequences for those whom they deem to be enemies.

Azam (2005) provides a model of rationally motivated terrorism (including suicide as a limiting case) by considering the individual to exhibit altruism towards future generations of his kin, which may be broadly defined. If a current terrorist act can provide a future payoff to his kin then altruism towards kin can induce that act despite its personal cost to the actor. Our model emphasizes altruism towards the current in-group rather than future kin. Bueno de Mesquita (2005) and Ferrero (2006) also offer theories of (suicide) terrorism based on economic models of expected benefits and costs. Our theory provides a framework that is complementary to these approaches.

Religious affiliation frequently cements the sense of group solidarity (but is not necessary for it). A high degree of altruism towards fellow group members is our explanation for why religious terrorist organizations are often more successful in accomplishing their goals than secular ones. In this respect our explanation differs from that of Berman (2011), who emphasizes the role of religion in controlling individual free-riding in successful terrorist organizations. In his approach it is the demand for terrorists by terrorist organizations that is central—organizations subject a, perhaps abundant, supply of potential terrorists to stringent screening mechanisms to weed out potential free-riders, thereby determining who will ultimately become active terrorists. Bueno de Mesquita (2005) has a similar organizational screening mechanism where "ability" is the key characteristic screened for. Our approach, in contrast, abstracts from the demand side and focuses on the decentralized source of supply, in order to isolate and investigate the role

played by identity. In general, one would expect both the demand and the supply sides to be relevant.

There is another feature of terrorism that requires careful attention if we are to think correctly about terrorism in the contemporary context. Kroenig and Pavel (2012) have pointed out that the war against terrorism differs significantly from the Cold War. In the Cold War era, the enemy was a well-defined state; in the war against terrorism, the enemy comprises a large number of individuals or groups making decentralized decisions. This matters because one rational theoretic reason for terrorism (as exemplified by Pape, 2006; Pape and Feldman, 2010) is that it is a vehicle for strategically forcing foreign governments to change their policies. This view is plausible when terrorism is conducted by a state or is state-sponsored. It is less plausible, however, when terrorism is decentralized since each terrorist has only so much power and cannot hope to single-handedly change a foreign government's policy. The motivation for terrorist activity, then, has to be something else—and this, we argue, is provided by the desire for retaliation stemming from a damaged sense of identity. Our approach does not presume that all terrorists seek to coordinate their actions or to behave as a monolithic unit. However, even when terrorists do operate in groups, they usually have separate cells that function independently in order to minimize the chances of detection (Chai, 1993). Our framework thus models decentralized terrorism to a good approximation; it does not merely represent 'lone wolf' terrorism.

There is evidence that stable democracies experience more terrorism than other political regimes (Eubank and Weinberg, 2001; Walsh and Piazza, 2010; Chenoweth, 2010). Democracies by their very nature are influenced by the preferences of voters. And so it might seem that terrorists exploit this and increase their attacks on democratic enemies to change their policies. This argument presumes terrorists coordinate their actions.

How, then, can we explain this observed correlation in the model we are proposing, in which terrorists are decentralized? Savun and Phillips (2009) show that it is the foreign policy of a country, not its democratic nature per se, that determines transnational terrorism. Neumayer and Plümper (2009, 2011) have shown that terrorism against the U.S. is also very much a response to the military aid given to the terrorists' home governments. This is consistent with our premise that it is the assault on identity, directly or by abetting it, that instigates decentralized terrorism. A country's foreign policy may even motivate immigrants and citizens with a dual identity to engage in domestic terrorism (Kowalski, 2012). In effect, identity considerations can help explain not only transnational terrorism but also 'homegrown' terrorism. If threats to identity are a key component of terrorist motivation, then government policies that serve either to aggravate or to ameliorate those threats are an essential and interactive component of the terrorism equation.

Identity can explain terrorist sympathy as well as terrorist activity. For example, the funding of terrorism is likely very sensitive to perceptions of injustice against people with a shared identity. Sympathizers can help out without actually executing terrorist acts themselves. Interventions in their countries by the West, for example, would increase their funding for terrorist activities against the West. Funding should also depend on the number of casualties of these countries in conflicts; and it should increase in the per capita income of the countries that feel victimized. Our theory of the role of identity in terrorism, then, could explain why it is empirically found that poverty is not a determinant of terrorism: (Krueger and Malečková, 2003; Krueger, 2008). Note, however, that the role of income or wealth is not the focus of this paper.

The theoretical framework of this paper, which is based on the concept of identity as a prime motivator of terrorist activities, delivers the following insights:

1. Social identity can make individual terrorist activities possible without coordination. Our framework facilitates an analysis of decentralized terrorism that benefits the in-group but is not organized or state-sponsored.

2. Altruism towards in-group members plays an important role in overcoming the potential free-riding of terrorists in the provision of a 'public good' for the in-group.

3. Terrorist responses to what are perceived as affronts to identity increase with the intensity of spite towards out-groups and, more interestingly, with the intensity of altruism towards in-groups.

4. While the intensity of terrorist actions is magnified by in-group altruism, it is out-group malevolence that is the more essential feature of identity that is pertinent to terrorism.

5. The cost of ignoring identity considerations of terrorism can be considerable to the country defending against it.

6. Some strategies that have been proposed for a country in conflict with others for economic or geopolitical reasons may lack credibility (in the sense of Schelling) when the social identity of terrorists is taken into account.

2 Social Identity

In their seminal paper on social identity as a key component in understanding inter-group conflict, Tajfel and Turner (1979, 1986) argue that it is important to extend

thinking about such conflict beyond material interest and individual motivation.[5] Opposed interests in obtaining scarce resources may promote conflict between groups. This conflict creates antagonism towards the out-group and heightens identification with and attachment to the in-group. They identify two extremes of social interaction. At one, the purely interpersonal extreme, behavior is fully determined by the interpersonal relationships and individual characteristics of the persons involved, without reference to their social groups or categories. This is behavior that would be considered purely egoistic. At the other, intergroup extreme, behavior is fully determined by the respective membership of individuals in specific social groups or categories. The keys to this latter socially motivated behavior are the innate tendency for people to categorize themselves and others in terms of specific social categories rather than as individuals. Here people assess their relative worth and that of their groups by comparison with other groups. Their sense of identity and self-esteem, to a greater or lesser extent, is tied up with group membership. Social identity refers to that part of intergroup behavior that is determined by social category rather than by individual self-interest, that is, by positive identification with members of one's own group and derogation of members of groups that stand in opposition to it.

Experiments show that it is trivially easy to induce in-group v. out-group motivations in pools of unrelated individuals (Tajfel et al., 1970)—such experiments were the initial motivation for the original specification of social identity theory. Hostility towards out-group appears to be particularly potent. Experiments show that members of a group will choose among distributions of a resource in a way that discriminates against members of the out-group rather than simply benefitting members of the in-group (Tajfel et al., 1970). If this is true is laboratory experiments, we would expect this behavior to be

[5]For reviews of the vast literature on social identity see Hogg (2003), and for its effects on intergroup interactions see Tajfel (1982).

even more pronounced when a real-world conflict of material interest occurs between different groups. Even casual observation shows that when one group threatens another in a physical or psychological way, the intergroup extreme of behavior based on social identity is seen to become increasingly important for the threatened group. It mobilizes members of that group towards solidarity with the in-group and towards disdain and detestation for the out-group. The motivation of individuals arising from this sense of social identity in an inter-group conflict situation may well overcome their motivations arising from routine concerns with personal (egoistic) utility. It is this behavior that is evident in terrorism.

The work of anthropologists, sociologists, and psychologists all point to humans having an innate sense of personal identity that acquires social and cultural stamps. Ingrained traits that are as fundamental and ubiquitous as these very probably have evolutionary roots. Eaton et al. (2011) have demonstrated how preferences reflecting 'Us and Them' can evolve in an evolutionary context. Competition between groups for resources is facilitated by such preferences in enhancing biological survival. These preferences exhibit altruism towards in-group members and spite towards out-group members. What is more, such preferences are evolutionarily stable, that is, mutants with different preferences will not survive in Darwinian natural selection. Konrad and Morath (2012) have similarly demonstrated robust evolutionary preferences towards in-group favoritism and out-group spite.

Social psychologists have recognized the relevance of social identity to the specific issue of terrorism. In the absence of such identity considerations, terrorism may appear to be perpetrated by irrational or dysfunctional individuals—which, they have pointed out that, is a serious error (Arena and Arrigo, 2005; Schwartz et al., 2009). Economists have yet to incorporate social identity into their analysis of terrorism. This is precisely

what this paper attempts to do, and we shall see that the consequences of doing so are non-trivial. We propose to extend the individual (egoistic) utility model of conventional economics to include aspects of motivation through social identity to examine the emergence of terrorism. In particular, we focus on an unorganized, decentralized form of terrorism. The key features of our modelling is the presence of an initial conflict around which positive in-group solidarity and spite towards the out-group crystalize in the preferences of the threatened group, which may lead to a terrorism outcome.

3 Incorporating Identity in a Model of Terrorism

Our goal here is to provide a model of decentralized terrorism that incorporates the notion of social identity. We set out a model of conflict between two countries, denoted A and B, where B has control of a resource in which A has an interest. We envisage development of the conflict taking place in two stages. In Stage 1, A, to secure its interest, applies an invasion effort X_A against B. In return B applies a defensive effort Z_B. (In this paper, the variable X will stand for aggressive action and the variable Z for defensive action.) The efforts X_A and Z_B together determine the share of the resource that A acquires. Denote this share by $S_A(X_A, Z_B)$, where S_A is increasing in X_A and decreasing in Z_B; B gets the complementary share $1 - S_A$.

In Stage 2, some citizens of B mount a terrorist campaign against A, with total terrorist effort X_B. Thus, while the formal defensive effort of B is undertaken by the state, the aggressive action emanating from B is decentralized, undertaken by individual terrorists. This is a peculiarity of the war on terror, as noted by Kroenig and Pavel (2012). In response to terrorist attacks, A sets up a defensive effort Z_A. Homeland security expenditures by A would be part of Z_A. The aggressive effort X_B of B, which is viewed as terrorism by A, is largely chosen in decentralized manner by some citizens

of B. Their expenditure of resources is driven by social-identity motivations against the backdrop of the inter-country resource conflict. Later on, we shall discuss how our model can capture homegrown terrorism too.

In the absence of social identity considerations the utility of a representative citizen of B depends only on the costs and outcome of conflict with A. This is given by the citizen's per-capita share of the net resource remaining to B after conflict has determined the fraction of the total resource V that each country gets. In this scenario the utility, $\hat{u}_B^i$, of individual i of B can be written

$$\hat{u}_B^i = \frac{(1 - S_A(X_A, Z_B))V - Z_B}{N_B} \tag{1}$$

where N_B denotes B's population. There is no role for individual terrorist activity with this specification of a person's utility since the latter is determined entirely by the aggregate state-level efforts, X_A andZ_B, of the two countries.

However inter-country conflict over a resource will often be of sufficient intensity to bring social identity considerations into play, whereby interactions between citizens of the opposing states become increasingly determined not by their individual material payoffs but by their respective memberships in different groups which are in conflict. Specifically, the concept of social identity leads to sharpened perceptions of difference between members of the in-group and those of the out-group. These perceptions are accompanied by favoritism towards the in-group and discrimination against the out-group even when acting on these biases proves costly from the point of view of the individual "self"(Tajfel and Turner, 1979, 1986).

To model these aspects of social identity we introduce to each individual's utility function a pair of parameters, (α, β), which capture the social-identity induced element of individual behavior. The parameter β, defined on the interval $[\underline{\beta}, \overline{\beta}]$, captures the

idea of discrimination or spite felt towards the other country and its citizens. The value of this parameter varies across individuals, so that each individual i in B receives a positive utility weighted by β^i from damage inflicted on A. Other things being equal, individuals who have high levels of dislike towards out-groups are more likely to become terrorists.

In our decentralized model, the damage inflicted on A by an individual i from B is given by $D_A(Z_A)x_B^i$, where $x_B^i \geq 0$ is the effort or resources committed by individual i to causing damage, $D_A(\cdot)$ measures the expected damage caused per unit of effort. This expected per-unit damage level is a decreasing function of Z_A, which represents A's expenditure of resources on an anti-terrorism or homeland-security effort. The total damage inflicted on A through decentralized terrorism arising in B will therefore be $D_A(Z_A)\sum_{j=1}^{N_B} x_B^j$. In general the utility that individual i in B gets per unit of damage inflicted on A will be a function both of the individual's spite parameter β^i and also of the extent of the resentment against A caused by the initial conflict. For simplicity we combine these sources of anti-out-group utility by measuring the marginal utility of a unit of damage done to A as $\beta^i X_A$. This is because X_A is a measure of the foreign presence on his country's soil, and the greater the foreign presence the greater is the individual's sense of identity violation.

We now re-specify the utility of an individual of B to include not just the material outcome from conflict, as above, but also the utility from spite arising from decentralized or spontaneous terrorist activity launched against A. In this scenario, the utility, $\bar{u}_B^i$, of

individual i of B can be written[6]

$$\bar{u}_B^i = \hat{u}_B^i + \beta^i X_A D_A(Z_A)(x_B^i + \sum_{\substack{j=1 \\ j \neq i}}^{N_B} x_B^j) - \gamma x_B^i - \frac{\delta}{2}(x_B^i)^2.$$

The first term on the right hand side is the utility from material gain, the second term is the utility individual i obtains from *all* the damage that terrorists of B inflict on A. The final two (linear-quadratic) terms reflect the personal cost to individual i of committing resources to terrorist activity, allowing for the possibility that individual i is active in this cause, with strictly positive x_B^i. We assume that the parameters γ and δ are positive. Clearly, γ denotes the minimum marginal disutility of (terrorist) effort to the individual.

Finally, to complete the formulation of social identity we introduce a parameter α, defined on the interval $[\underline{\alpha}, \overline{\alpha}]$, which captures the idea of favoritism towards other members of the in-group. We allow individual i in B to value the utility received by fellow-citizens according to the weight α^i. As before, we allow the value of this parameter to vary across individuals; we suppose also that $[\underline{\alpha}, \overline{\alpha}]$ is a subset of $[0, 1]$. As we will see, other things being equal, individuals who have high levels of favoritism towards the in-group are more likely to become terrorists.

In our model, the altruism parameter α and the spite parameter β together capture the implications for individual behavior by the citizens of B of a sense of *social identity*. The former parameter captures in-group solidarity and the latter out-group dislike.

The utility function, u_B^i, that captures the preferences of individual i from B can

[6]Linearity of the income term $\hat{u}_B^i$ ensures that our model cannot address the role of income/wealth in provoking terrorism, a key concern of both Azam (2005) and Bueno de Mesquita (2005).

now be written

$$u_B^i = \bar{u}_B^i + \alpha^i \sum_{\substack{k=1 \\ k\neq i}}^{N_B} \bar{u}_B^k,$$

or, using the previous definitions and collecting terms, as

$$\begin{aligned} u_B^i =& \hat{u}_B^i + \alpha^i \sum_{k\neq i}^{N_B} \hat{u}_B^k - \alpha^i \sum_{k\neq i}^{N_B} (\gamma x_B^k + \frac{\delta}{2}(x_B^k)^2) \\ &+ (\beta^i + \alpha^i \sum_{k\neq i}^{N_B} \beta^k) X_A D_A(Z_A)(x_B^i + \sum_{j\neq i}^{N_B} x_B^j) - \gamma x_B^i - \frac{\delta}{2}(x_B^i)^2. \end{aligned} \tag{2}$$

The first two terms on the right hand side of the first line are person i's utility from material sources, plus the weighted sum of the material utility of his fellow-citizens; the third term is the weighted sum of the disutility of all others' resource expenditures, x_B^k. The values of these terms are outside individual i's control and so have no implication for his/her behavior. The terms on the second line are the key ones. The first one captures individual i's satisfaction from the damage inflicted on A (that is, $D_A(Z_A)(x_B^i + \sum_{j\neq i}^{N_B} x_B^j)$. One component of this utility comes from the own spite parameter, β^i, but a second component, $\alpha^i \sum_{k\neq i}^{N_B} \beta^k$ comes from the (altruistic) valuation of the utility accruing to his fellow citizens from the same damage.[7] This second component is likely to greatly overwhelm the first in magnitude. The motivation to hurt the enemy is greatly magnified by the fact that not just the perpetrator derives utility from the damage ($\beta^i > 0$), but also the perpetrator's compatriots do so too ($\sum_{k\neq i}^{N_B} \beta^k > 0$). The latter is valued by the original perpetrator of terrorism because he is altruistic towards his in-group members (assuming $\alpha^i > 0$). The final terms on the second line denote i's linear-quadratic disutility of effort.

[7]The source and role of altruism in this model is complementary to its role in Azam (2005).

The citizens of B choose terrorist efforts x_B^i in a *decentralized* fashion, ignoring the strategic consequences of their actions. This is reasonable since they are not acting in concert, or organized at a national level. They pursue their actions because of their outrage at foreign military presence in their country. Thus their goal is not directly to influence A's foreign policy, which would be irrational at the individual level. Nevertheless, they may end up having some influence through their aggregate actions. Dropping the terms which are independent of x_B^i in the above objective function, we see that in effect individual i solves

$$\max_{x_B^i} \qquad (\beta^i + \alpha^i \sum_{k \neq i}^{N_B} \beta^k) X_A D_A(Z_A)(x_B^i + \sum_{j \neq i}^{N_B} x_B^j) - \gamma x_B^i - \frac{\delta}{2}(x_B^i)^2.$$

In general, the solution effort is given by

$$x_B^i := x_B(\alpha^i, \beta^i) = \max[0, \ \big((\beta^i + \alpha^i \sum_{k \neq i}^{N_B} \beta^k) X_A D_A(Z_A) - \gamma\big)/\delta]. \tag{3}$$

The aggregate level of decentralized terrorism arising from B is

$$X_B = \sum_{j=1}^{N_B} x_B(\alpha^j, \beta^j). \tag{4}$$

For convenience we sum over all citizens but take into account the fact that $x_B(\alpha^j, \beta^j) = 0$ for all who are not terrorists.

The individual will devote himself to the terrorist cause of inflicting damage on A when the perceived marginal benefit exceeds the least disutility of effort (γ, which

occurs at $x_B^i = 0$), that is, when

$$(\beta^i + \alpha^i \sum_{k \neq i}^{N_B} \beta^k) X_A D_A(Z_A) > \gamma. \tag{5}$$

On the other hand, individuals for whom this strict inequality is reversed will choose a zero level of terrorist activity. The boundary case in which an individual is on the verge of becoming active occurs when (5) holds with strict equality.

To analyze this boundary note that adding and subtracting $\alpha^i \beta^i$ on the left-hand side of (5) allows the term in parentheses to be rewritten as $\beta^i(1-\alpha^i) + \alpha^i(\sum_{k=1}^{N_B} \beta^k)$. Taking the population value $\sum_{k=1}^{N_B} \beta^k$ as parametric the terrorist/non-terrorist boundary is the set of social identity parameters (α, β) such that

$$\beta(1-\alpha) + \alpha(\sum_{k=1}^{N_B} \beta^k) = \chi, \tag{6}$$

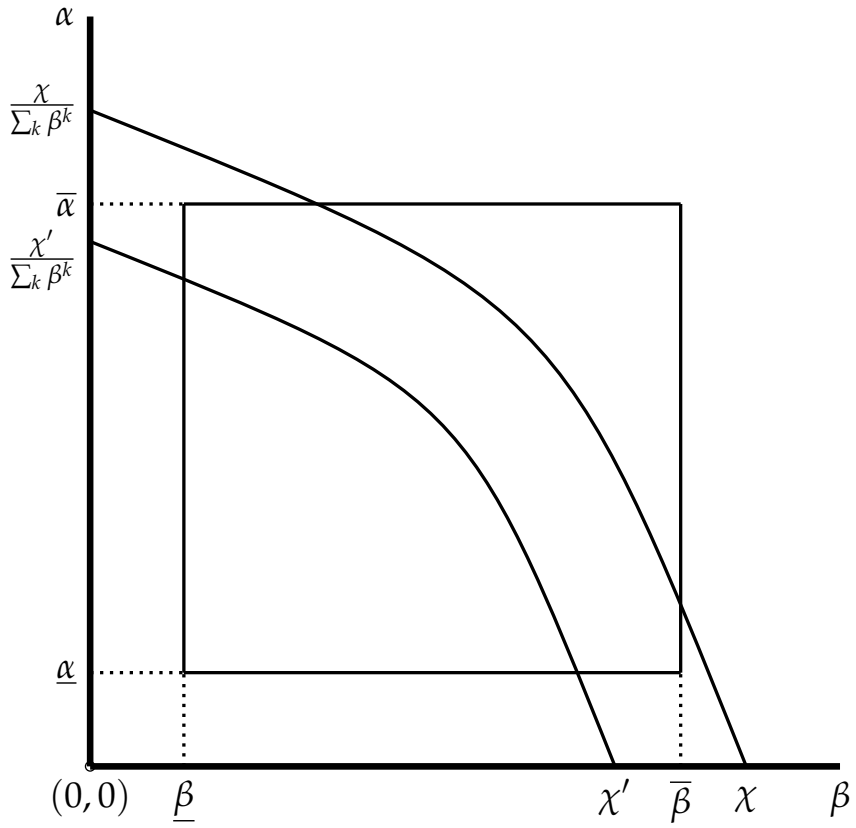
where $\chi := \frac{\gamma}{X_A D_A(Z_A)}$. This variable χ is the ratio of the lowest marginal disutility to an individual of terrorist effort to the marginal benefit per unit of his/her terrorist effort. Since both X_A and Z_A are endogenous, so is χ.

Who becomes a terrorist and who does not is illustrated in (α, β) space as in Figure 1. Suppose that the population of B is distributed over the parameter space $[\underline{\beta}, \overline{\beta}] \times [\underline{\alpha}, \overline{\alpha}]$. For a given χ, the terrorist/non-terrorist boundary equation, (6), is shown as the downward-sloping curve between $\big(0, \chi\big)$ along the horizontal axis and $\big(0, (\chi / \sum_k \beta^k)\big)$ on the vertical. For a different value $\chi' < \chi$, it is shown as the curve between $\big(0, \chi'\big)$ and $\big(0, (\chi' / \sum_k \beta^k)\big)$.[8]

Every individual with parameter values within the population who is on or below

[8]From (6) the slope of this boundary between the indicated end-points is $d\alpha/d\beta = (1-\alpha)/(\beta - \sum \beta^k) < 0$, since $\alpha < 1$ and $\beta < \sum \beta^k$. The second derivative is $d^2\alpha/d\beta^2 = -2(1-\alpha)/(\beta - \sum \beta^k)^2 < 0$, indicating the curvature shown.

Figure 1: Partition of population B into non-terrorist and terrorist. Two possible boundary lines are shown, one based on χ the other on χ'.



the relevant line is a non-terrorist in that their commitment of resources to terrorism, $x_B(\alpha, \beta)$, is zero. Denote the number of such non-terrorist individuals by N_{NT}. Every individual who is in the population but with (α, β) values putting them strictly above the curve is a terrorist with strictly positive activity, $x_B(\alpha, \beta) > 0$. The number of individuals who are terrorists is simply the population less the number of non-terrorists. That is,

$$N_T = N_B - N_{NT}.$$

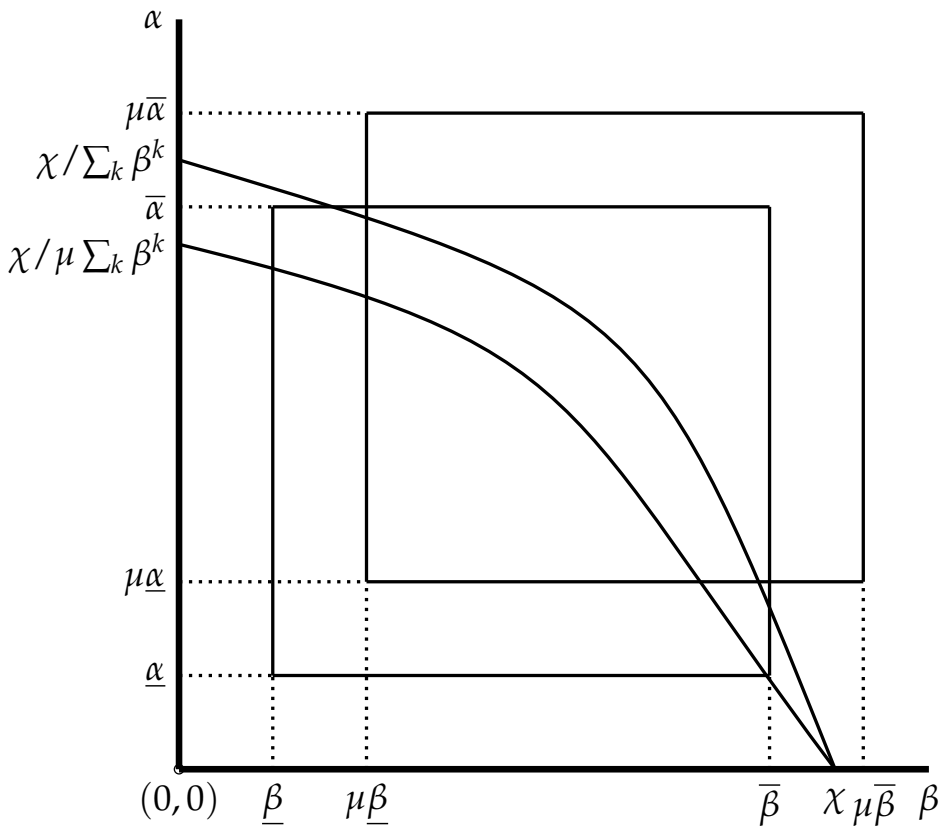
In general, intuition suggests that individuals who are most spiteful, that is, those who have the highest β values, are most likely to be terrorists. However, we have also

seen that feelings of altruism towards members of one's in-group are important in providing motivation towards spiteful acts. In the figure, what can be seen in general is that it is (α, β) pairs in which each parameter tends to be relatively high that are more likely to give rise to terrorism. That is, terrorism is most likely when the individual is strongly motivated by both aspects of social identity, the spiteful and the altruistic. Studies of terrorists have shown that membership in altruistic organizations is a commonly shared characteristic. Our approach to social identity shows why such an unexpected trait may underlie reprehensible behavior. In particular, individuals with high spite but low altruism will not be terrorists if the level of spite is not too high; e.g. for the χ-based boundary line in the figure, where $\overline{\beta} < \chi$ obtains, the highest individual level of spite is not sufficient to lead to a terrorist act unless the person's altruism for the in-group is also sufficiently high. On the other hand, for the χ' boundary, even very low levels of spite (close to $\underline{\beta}$) can give rise to terrorism if the individual's sense of altruism is high.

There is an obvious moral hazard problem here in terrorist activity: each terrorist is tempted to free-ride on the effort of others. This is the focus of models of terrorism in Berman (2011). But we note here that when there is the slightest degree of altruism ($\alpha^i > 0$), the payoff of a unit of effort to terrorist i of inflicting damage on A increases from $\beta^i X_A D_A(Z_A)$ to $(\beta^i + \alpha^i \sum_{k \neq i}^{N_B} \beta^k) X_A D_A(Z_A)$. Since country populations are typically large (in the millions), even the smallest amount of altruism among terrorists for their in-group can greatly increase their individual effort. This is likely to overwhelm the effect of free-riding among terrorists. By ignoring altruism among potential terrorists for their fellow citizens and focusing on the potential free-riding aspect, A would be vastly underestimating the scale of terrorist effort.

Comparative statics with respect to the number of terrorists are straightforward. Anything that decreases χ moves the terrorism boundary in a southwesterly direction,

Figure 2: An upward shift in the support of the population distribution of (α, β), and the accompanying rotation of the boundary line, result in an increase in the number of terrorists.



increasing the number of terrorists (compare the χ and χ' boundaries in the figure). Also, χ is decreasing in X_A and D_A and is increasing in Z_A. So the number of terrorists increases: as the size of the initial incursion by A (as measured by X_A) increases; as the damage per terrorist activity against A increases; and it decreases the larger is the countermeasure Z_A, which acts through a reduction in terrorist damage.

Further, anything which shifts the distribution of the identity parameters upwards, increasing the values α^i and/or β^i for each individual in the population, will also serve to increase the number of terrorists. Define a population shift parameter $\mu > 1$ that, when applied to the support of the population distribution, can shift the support boundaries

(that is, $[\mu\underline{\alpha}, \mu\overline{\alpha}]$ and/or $[\mu\underline{\beta}, \mu\overline{\beta}]$). If such a population shift raises either α^i or β^i then it will raise the effort level of current terrorists and will shift others from the boundary into activity. In Figure 2 it is clear how an increase in the support of both α and β shifts the population parameter values to the northeast, while the increase in the support of β rotates the boundary line to the south west. These effects reinforce each other in increasing the number of terrorists.

Comparative statics for the individual level of terrorist effort defined in (3) are also straightforward. Suppose for an individual i that the second term in (3) satisfies the inequality

$$\big((\beta^i + \alpha^i \sum_{k \neq i}^{N_B} \beta^k) X_A D_A(Z_A) - \gamma\big)/\delta \geq 0$$

then this individual either already has positive terrorist effort, or is on the verge of it. First, an increase in the level of A's initial conflict expenditure, X_A, will raise the activity level x_B^i of all such individuals. Contrariwise, an increase in A's countermeasure to terrorism, Z_A, which acts to reduce the damage inflicted, has the opposite effect; it will reduce the activity level of current terrorists and will move some of them to the inactive boundary.

Second, if $x^i := x_B(\alpha_i, \beta_i) \geq 0$ then terrorist effort, $x_B(\alpha, \beta)$ for $\alpha > \alpha^i$ and/or $\beta > \beta^i$ will be larger than x_B^i. Thus, within a population, individuals with higher parameter values undertake higher levels of terrorist activity.

Finally, there is an effect from an upward shift in the distribution of population values of α and β. For the population-shift parameter μ defined above, if such a shift is applied to either α or β, or to both, then it will raise the effort of current terrorists and will shift others from the boundary into activity.

It is convenient to summarize these comparative static effects in a lemma that pertains to the individual effort level, the aggregate effort level, and the number of terrorists.

Lemma 1: The individual effort level, the number of terrorists, and the aggregate level of terrorist activity, X_B defined in (4): (i) are each increasing in X_A; (ii) are each decreasing in Z_A; and (iii) are each increasing in positive shifts in the support of the parameters (α, β).

The greater A's foreign presence in B is, the larger is the number of terrorists, the greater is individual effort and hence the greater is aggregate effort. The more resources A devotes to homeland security, the lower is the damage the terrorists can inflict and their perceived benefits thereof, and the fewer is the number of terrorists and the lower their effort levels. The greater the altruism towards one's fellow citizens, and/or the greater the spite towards the out-group the larger will be the number of terrorists and their effort levels. In particular this shows the importance of in-group altruism for terrorist activity, as documented in numerous studies: see, for example, Atran (2010).

For later use we will record the dependence of aggregate terrorist effort on the various parameters as

$$X_B = \Phi_B(X_A, Z_A, \mu)$$

where Φ depends negatively on Z_A and positively on X_A and μ.

We now complete the modelling of Stage 2. A, faced with the terrorist activity X_B, solves its homeland security problem by minimizing the sum of damage and security expenditures. We assume Nash behavior on the part of both the terrorists and the government of A. A solves

$$\min_{Z_A} \qquad D_A(Z_A)X_B + Z_A, \tag{7}$$

taking X_B, under Nash behavior, as parametric. The solution to this problem, $\Psi_A(X_B)$, will determine the optimal degree of homeland security given its foreign commitment

and the level of terrorist activity. This function will be increasing in X_B.

The outcome in Stage 2 will be determined by the solution to the simultaneous equations

$$X_B = \Phi_B(X_A, Z_A, \mu); \quad Z_A = \Psi_A(X_B). \tag{8}$$

Denote this Nash equilibrium by the doublet $[\widehat{X}_B(X_A, \mu), \widehat{Z}_A(X_A, \mu)]$. The properties of this equilibrium are demonstrated in the following result.

Proposition 1: In the Stage 2 Nash equilibrium,

(*i*) B's aggregate terrorist effort, $\widehat{X}_B$, is increasing in A's invasion effort, X_A, and in the shift parameter μ;

(*ii*) A's defensive effort, $\widehat{Z}_A$, is increasing in its invasion effort, X_A, and in the shift parameter μ.

Proof:

(*i*) Substituting $Z_A = \Psi_A(X_B)$ into the right hand side of the first equation in (8), we obtain

$$\widehat{X}_B = \Phi_B(X_A, \Psi_A(\widehat{X}_B), \mu).$$

Taking the total derivative of the above equation with respect to X_A and μ respectively, and rearranging, we obtain

$$[1 - \frac{\partial \Phi_B}{\partial Z_A}\frac{\partial \Psi_A}{\partial X_B}]\frac{d\widehat{X}_B}{dX_A} = \frac{\partial \Phi_B}{\partial X_A}; \quad [1 - \frac{\partial \Phi_B}{\partial Z_A}\frac{\partial \Psi_A}{\partial X_B}]\frac{d\widehat{X}_B}{d\mu} = \frac{\partial \Phi_B}{\partial \mu}.$$

Since $\partial \Phi_B/\partial Z_A < 0$; $\partial \Psi_A/\partial X_B > 0$; $\partial \Phi_B/\partial X_A > 0$; $\partial \Phi_B/\partial \mu > 0$; it follows that $d\widehat{X}_B/dX_A > 0$ and $d\widehat{X}_B/d\mu > 0$.

(*ii*) Since $\Psi_A(X_B)$ is increasing in its argument, it follows that $d\widehat{Z}_A/dX_A > 0$ and

$d\widehat{Z}_A/d\mu > 0$.

□

An increase in the parameter μ implies an increase in the level of altruism and/or spite in the population of B. As we have seen, so long as some terrorism exists then an increase in μ will increase both the number of terrorists, and the level of their activity, in Nash equilibrium. Therefore $\widehat{X}_B$ increases with these aspects of social identity. And in response, A's level of homeland-security expenditure increases in Nash equilibrium. It is interesting to look at some aspects of altruism and spite in this type of context.

Culture certainly is an important ingredient of what determines group solidarity. And religion is an important component of culture. Marshall (1960), in his comparison between Christianity and Islam, has argued that Islam, for example, is a community-oriented religion while Christianity is individually oriented.[9] If this view is correct, Islam is likely to contribute to group solidarity.[10] This would suggest that invasion of a country in which the majority subscribes to a group-oriented religion would invite a more vigorous response because of the greater altruism towards co-religionists. Religious identity, which engenders greater empathy for the plight of other in-group members, is responsible for this. What may be perceived as terrorism by the target populations may be viewed by the putative terrorists as a defensive action against an assault on identity. This suggests a reason why religious terrorist organizations are more lethal than non-religious terrorist organizations. The in-group identity cemented by religion enhances altruism and reduces free-riding. This reason is different but not orthogonal to that emphasized by Berman (2011), namely, religious terrorist groups typically provide social (public) services to the in-group and are required to become adept at weeding

[9]Ferrero (2014) (p. 19, fn. 12) argues that the actual name of this author was likely Marshall G.S. Hodgson.

[10]This effect is absent in other religions like Hinduism, for example, in which, like in Christianity, the highest ideal is the pursuit of individual salvation.

out free-riding. In-group identity, of course, does not require religious affiliation. The Tamil Tigers who sought autonomy in Sri Lanka did not view themselves as religious; nevertheless, they extensively practiced suicide bombings in their attempt to achieve their goals (Hopgood, 2005). It is shared identity that is the driving force.

Given the importance of spite in the preferences of terrorists, one action that might be helpful to reduce terrorism—though not for the usual reasons presumed—is for A to offer economic aid to B. This would work in our framework even if the aid offered is small relative to the per capita income in B. Empirical evidence shows that poverty is not a factor that instigates terrorism, so promoting economic development per se would not necessarily work to reduce terrorism. Nevertheless, economic aid may work because the offering of aid facilitates communication and lead to a reduction in the tendency to dehumanize the enemy. Such overtures would blur the distinction between 'Us' and 'Them' somewhat and induce a leftward shift in the distribution of the spite parameter β. This, in turn, would reduce not only the number of terrorists but also the intensity of terrorist actions by those who remain terrorists.

Dugan and Chenoweth (2012) have argued that, instead of increasing the punishment to terrorists as a way of dissuading them, a more effective strategy might be to increase their utility of not engaging in terrorism. Using data for the period 1987 to 2004, the authors examine the effects of repressive and conciliatory actions by the Israeli government towards the Palestinians. They find that repressive measures either do not have any effect or they increase future terrorist activities. In contrast, sustained conciliatory actions by the Israeli government reduced subsequent Palestinian terrorism. These findings are consistent with our claim here that, since identity is extended over the entire in-group, benefits offered to the in-group would soften the 'Us/Them' dichotomy and reduce terrorism.

In view of the result in Proposition 1, A will have to recognize that a more aggressive invasion in Stage 1 will induce a greater terrorist response in the next stage that, in turn, will require more resources for homeland security. In other words, if A is foresighted, it will undertaken its actions in Stage 1 with full awareness of its consequences. We characterize the properties of the subgame perfect Nash equilibrium, which requires that we work backwards from Stage 2 to Stage 1 to ensure that expectations are consistent with what actually transpires. We shall later examine the effects of miscalculations in this regard, especially when A neglects identity considerations.

Turning now to Stage 1, we suppose that the two countries play a Nash game with respect to the choice of the country-level variables X_A and Z_B. In Stage 1 we assume that B will choose Z_B to maximize the sum of its citizens utilities, as indicated in (2). The variable Z_B appears only in the terms $\hat{u}_B^k$. The other terms can be ignored from the point of view of B's stage 1 maximization problem. Adding this $\hat{u}_B^k$ terms over the population and simplifying using (1), gives B's stage-1 objective as

$$\max_{Z_B} W_B := \nu\big[(1 - S_A(X_A, Z_B))V - Z_B\big] \tag{9}$$

where $\nu = (N_B + (N_B - 1)\sum_1^{N_B} \alpha^i)/N_B$. The term in the bracket is simply the share of the resource V that B retains after conflict, net of the expenditure on Z_B.

In Stage 1, A ought to take into account the fact that the action X_A will induce a terrorist response X_B in the Stage 2 Nash equilibrium. In this case its Stage 1 objective will be

$$\max_{X_A} W_A := [S_A(X_A, Z_B)V - X_A] - D_A(\widehat{Z}_A(X_A, \mu))\widehat{X}_B(X_A, \mu) - \widehat{Z}_A(X_A, \mu), \tag{10}$$

where the first square bracket captures the benefit to A from acquiring foreign resources

and the remaining terms are the costs associated with terrorist retaliation and homeland security in the Stage 2 Nash equilibrium. Denote the Nash equilibrium solution to the game. described by (9)–(10) as (X_A^*, Z_B^*). This Nash solution determines the subgame perfect equilibrium (SPE) of the overall game.[11]

3.1 The Cost of Ignoring Identity

In this model, we have focused on a realistic feature of contemporary terrorism, namely, the fact that it is decentralized. If terrorist acts were centralized, the government of B could use terrorism to inflict damage on A. However, when terrorism is completely decentralized, as in this model, this is not possible. In other words, terrorism is not employed here for strategic purposes. What generates terrorism in this model is identity, as captured by the preference functions of the citizens of B: the parameters α and β, which respectively capture altruism for the in-group and spite for the out-group. If we set $\alpha = \beta = 0$, income would be their only concern; the individual (and aggregate) terrorist effort would fall to zero. This model, then, isolates the contribution of identity to terrorism.

If identity concerns were completely absent, no damage due to terrorism would be incurred by A and it would need to put in place no homeland security measures. The Stage 1 optimizations confronting countries A and B would be simply

$$\max_{X_A} \quad [S_A(X_A, Z_B)V - X_A]; \qquad \max_{Z_B} \quad [S_B(X_A, Z_B)V - Z_B]. \tag{11}$$

Denote the Stage 1 Nash equilibrium solution in this scenario by $(X_A^\dagger, Z_B^\dagger)$. What we

[11] However, it is reasonable to question whether governments see through the resolution of the problem and implement the SPE. History offers ample examples to suggest that frequently they may not.

have here is the standard conflict model (Hirshleifer, 1988; Skaperdas, 1992). A resource worth V is being contested and the shares of V accruing to the contenders are given by their relative invasion and defensive efforts.

Proposition 2: The magnitude of A's optimal invasion expenditure when it ignores identity exceeds its optimal magnitude when it correctly anticipates the effects of identity.

The proof of this follows from the fact that A's reaction function for X_A in terms of Z_B when it ignores identity sets the marginal benefit of greater resource appropriation to the resource cost of the marginal unit allocated to invasion. When it takes identity into account, the marginal benefit remains the same but the latter cost now includes the extra cost of terrorism and of homeland security. Therefore, A's reaction function for X_A in terms of Z_B will now be lower than before. However, the reaction function for B's defensive expenditure Z_B in terms of X_A stays the same. Thus the equilibrium value of X_A will be lower when A correctly accounts for identity in terrorist attacks.

When A ignores the effects of identity, and thus does not anticipate terrorism and also the need for devoting resources to homeland security, the resulting damage to A from this oversight is given by

$$D_A(0,\mu))\widehat{X}_B(X_A^\dagger,\mu).$$

The magnitude of the shortfall in A's objective due to the oversight is given by the difference between (10) evaluated at the subgame perfect Nash equilibrium (X_A^*, Z_B^*) and evaluated at the Nash equilibrium $(X_A^\dagger, Z_B^\dagger)$.

3.2 The Coordinating Role of Social Identity

Social identity plays a role in coordinating—without an explicit organization—the actions of those who act in a decentralized fashion. As a result, it achieves some benefits for B that would not have otherwise been possible. To see this important function of identity, let us consider the model without social identity of the above subsection. We keep the argument reasonably informal so as to minimize technical machinery when the intuition can be delivered easily.

In this standard model of conflict, suppose we introduce the possibility of the citizens of B inflicting a damage on A through an action that may be terrorism or simply "resistance". Suppose that, as before, we denote the effort of individual i of B by x_B^i and the aggregate effort by X_B. The utility of this individual can then be written

$$U_B^i = [1 - S_A(X_A, Z_B)]V/N_B - Z_B/N_B - \gamma x_B^i - (\delta/2)(x_B^i)^2.$$

If the above function is maximized by the individual, the optimal solution will obviously be $x_B^i = 0$. This is because there is no *individual* benefit to "resistance" of this nature. However, would there have been a collective benefit? Yes. Suppose the government of B could arrange by fiat a non-zero collective effort of resistance X_B, which will inflict a total damage of $D_A(Z_A)X_B$ on A. This would call forth some resources for homeland defense, Z_A in A, which would solve (7), the solution to which we denoted by $\Psi_A(X_B)$. Thus in Stage 1, the problem confronting A would be

$$\max_{X_A} \qquad [S_A(X_A, Z_B)V - X_A] - D_A(\Psi_A(X_B))X_B - \Psi_A(X_B). \tag{12}$$

As we have argued above, the solution to (12) for X_A, call it $\widetilde{X}_A(X_B)$, when $X_B > 0$

will clearly be less than the Nash equilibrium value $X_A^\dagger$ of the standard conflict game. This in turn would benefit B because the maximized objective in (11) would be higher in the new Nash equilibrium that is contingent on X_B. In other words, the share of the resource value V that B obtains in the conflict will be higher if there were a concerted resistance effort $X_B > 0$. If the net material benefit to B is increasing in X_B at $X_B = 0$, B is strictly better off with resistance of this nature even when each individual values only his own income and nothing else.

The precise determination of the optimal aggressive action of B should that be coordinated by the government is a technically (but not conceptually) complicated matter. One simple way to determine the value of X_B that the government of B would want is to posit that X_B is chosen by the state as a deterrent through a "Tit-for-Tat" sort of strategy. Such a strategy might be modeled, for example, by positing that X_B would be proportional to A's invasion force, X_A. That is, $X_B = \theta_B X_A$, where the constant of proportionality θ_B (> 0) would depend on how affluent the country is.

In the absence of coordination (through state intervention or otherwise), no such effort will arise because each citizen of B will perceive no private benefit to such effort. This is the standard problem of a public good: it is not individually rational to contribute to a public good in a world without social identity.

In a model which incorporates social identity, however, even in decentralized decision-making we will have $X_B > 0$, as we have seen. It is the reaction against a foreign assault on individual and social identity that motivates action, not the lure of private benefits. In other words, the existence of identity solves, to some extent, the standard problem of free-riding in public good provision. This shows that rational choice models that ignore identity seriously underestimate the intensity of the rival's non-state response of defense.

4 A Simplified Model

Consider a simplified version of the model. There are two simplifications. First, the altruism parameter α and the spite parameter β are assumed to be the same for all individuals of B. Second, the number of terrorists is exogenously fixed at some level, N_T. Suppressing individual choice in whether or not to become a terrorist significantly reduces the computational complexity because there is one less endogenous margin. Nevertheless, as X_A changes the terrorist response in terms of effort also changes even when the number of terrorists remains constant. In reality, the response of terrorist effort would be more elastic than in this model. So the simplification offers an informal idea of a "lower bound" on the terrorist response due to identity considerations. The exogeneity of N_T can be reasonably justified on the premise that only those who have no family obligations etc. may be available for terrorist activity. We may now also drop the linear term in the disutility of effort, that is, set $\gamma = 0$ since this parameter plays no role.

Using expression (3), the aggregate terrorist effort can be written down as

$$X_B = [\beta N_T(1 + \alpha N_B)/\delta]\, X_A D(Z_A). \tag{13}$$

Recall that in Stage 2, A chooses its resource allocation to homeland security by solving (7). For simplicity, suppose we assume that

$$D(Z_A) = D_0/Z_A, \quad D_0 > 0. \tag{14}$$

For Z_A, the Nash best response function, $Z_A^{br}(X_B)$, which is the solution to (7), is readily

seen to be

$$Z_A^{br}(X_B) = \sqrt{D_0 X_B}. \tag{15}$$

Substituting (15) into (14) and this into (13), we obtain the aggregate terrorist effort in the Stage 2 Nash equilibrium as

$$X_B = [\beta N_T(1 + \alpha N_B)\sqrt{D_0}/\delta]^{2/3}(X_A)^{2/3}. \tag{16}$$

As expected, B's terrorist effort is increasing in A's invasion effort. Two points about the role of preferences are apparent from the simple expression above. As long as the preferences exhibit spite for the out-group (that is, $\beta > 0$), an increase in altruism for the in-group increases terrorist effort. Analogously, for given level of in-group altruism α, an increase in out-group spite increases aggregate terrorist effort. So in a sense, in-group altruism and out-group spite are complementary in generating terrorist effort. However, there is an important caveat. Even in the absence of in-group altruism, there would be terrorist effort albeit diminished. The reverse, however, is not true. If there were no out-group spite, no amount of in-group altruism would generate terrorist effort when it is decentralized.

Why the asymmetry between out-group spite and in-group altruism? It is because terrorism is inflicted only against the out-group.[12] Altruism towards the in-group magnifies this terrorism, because it is done not merely to preserve one's own sense of identity but also because it confers a similar benefit on other members of the in-group. In the absence of spite in the entire population of B, the primal cause for terrorism is missing and there is nothing that in-group altruism can magnify. Nevertheless, it is important to recognize that, when there is some spite, even a small amount of altruism towards

[12]This is for the case where all the α's and β's are the same. If these differed across people, a person with 0 spite can become a terrorist if he is altruistic about the utility of his spiteful countrymen.

each in-group member can greatly magnify a terrorist's effort. We claim that it is this that is responsible for why terrorists do not exhibit the sort of free-riding that standard rational choice models might expect. It also explains why terrorists often claim that they are patriots. It is in-group altruism that sets them apart from common, self-centered criminals; it is their wanton disregard for the lives of out-group members, however, that sets them apart from patriots and renders them terrorists.[13]

The minimized Stage 2 expenditures of A in (7) works out to

$$\phi\, {X_A}^{1/3}, \quad \text{where} \quad \phi \equiv 2[\beta N_T(1+\alpha N_B)(D_0)^2/\delta]^{2/3}.$$

Suppose the share functions $S_A(X_A, Z_B)$ and $S_B(X_A, Z_B) \equiv 1 - S_A(X_A, Z_B)$ are given by

$$S_A(X_A, Z_B) = \frac{\lambda X_A}{\lambda X_A + Z_B}; \quad S_B(X_A, Z_B) = \frac{Z_B}{\lambda X_A + Z_B},$$

where $\lambda \geq 1$ is a measure of the asymmetry in military power in favor of A.

In Stage 1, if A correctly anticipates the terrorist response, it solves

$$\max_{X_A} \quad \frac{\lambda X_A}{\lambda X_A + Z_B} V - X_A - \phi\, {X_A}^{1/3},$$

the first order condition for which simplifies to

$$\frac{\lambda Z_B}{(\lambda X_A + Z_B)^2} V = 1 + (\phi/3) {X_A}^{-2/3}. \tag{17}$$

[13]The logic in this paragraph reveals why it is not appropriate to represent identity with a single parameter in this model. It might seem that a single parameter (α say) could do double-duty—higher values of α representing greater in-group altruism *and* greater out-group spite. But such an expedient would wash out aspects of preferences that have different effects on terrorism.

In Stage 1, the maximization of B is essentially

$$\max_{Z_B} \quad \frac{Z_B}{\lambda X_A + Z_B} V - Z_B,$$

the first order condition for which is

$$\frac{\lambda X_A}{(\lambda X_A + Z_B)^2} V = 1. \tag{18}$$

Comparing the first order conditions (17) and (18), we immediately see that

$$Z_B = X_A[1 + (\phi/3){X_A}^{-2/3}].$$

Substituting for Z_B from the above expression into (18), we see that the subgame perfect choice of X_A is the solution to

$$\frac{\lambda X_A}{[(1+\lambda)X_A + (\phi/3){X_A}^{1/3}]^2} V = 1,$$

that is, to

$$\lambda X_A V - [(1+\lambda)X_A + (\phi/3){X_A}^{1/3}]^2 = 0.$$

The solution to this nonlinear equation gives us the invasion effort of A in the subgame perfect equilibrium. Then (16) and (18) yield B's equilibrium terrorist and defensive effort levels, respectively, and (15) yields A's equilibrium defensive effort.

Figures 3 through 7 present some simulations of the model that bring out the importance of social identity. In these graphs, the in-group altruism parameter α is held fixed and the out-group spite parameter β is varied between 0 and 1. In Figures 3 - 7, along the blue curve $\alpha = 0$ and along the red $\alpha = 0.2$. Figure 3 displays the invasion

effort X_A of A in the subgame perfect equilibrium as a function of the spite parameter β. First, notice that as spite increases the equilibrium invasion effort of Country A declines. Secondly, when the level of altruism in B is positive, A's invasion effort is even lower. Greater altruism magnifies terrorist effort, as shown in Figure 4. Correctly anticipating this, A reduces its invasion effort when α is higher. Figure 5 shows that the share of the resource captured by A declines in β and also in α.

Figure 3: $X_A(\beta;\alpha)$ in SPE solution.

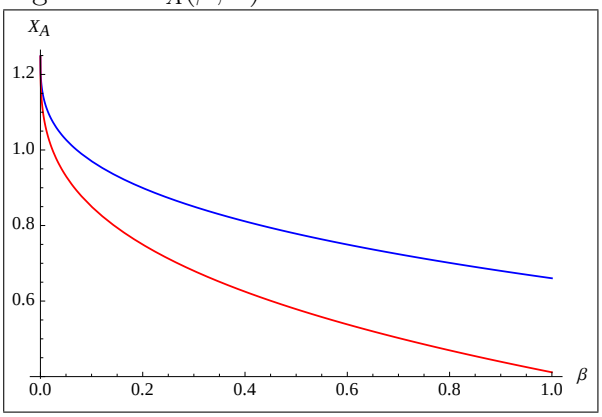


Figure 4: $X_B(\beta;\alpha)$ in SPE solution.

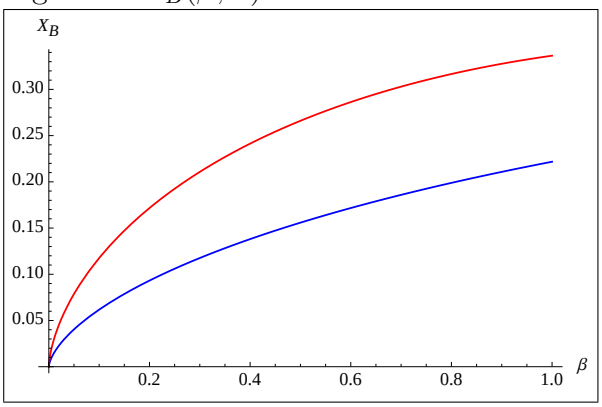


Figure 5: $S_A(\beta;\alpha)$ in SPE solution.

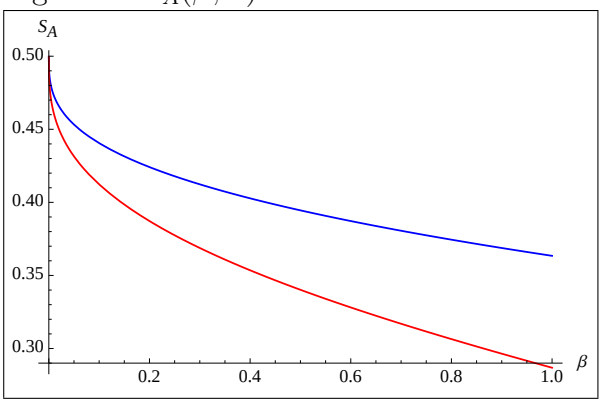


Figure 6 displays the net benefit to A of invading B. It is the value that the objective function (10) of A achieves in the subgame perfect equilibrium. The upper curve corresponds to $\alpha = 0$ and the lower to $\alpha = 0.2$. As one would expect, the benefit to A of its invasion effort declines in β and in α. These curves illustrate an important point: when the spite level is sufficiently high, the net benefit to A becomes negative, that is, the country would have been better off not invading B at all. Furthermore, when $\alpha > 0$, the critical level of spite at which the net benefit turns negative is lower.

The results in Figure 6 offer an important insight. Invading a foreign country may well be Country A's interest when social identity is a non-issue. As can be seen from this Figure, the net benefit to Country A from invading Country B is positive when $\alpha = \beta = 0$. If preferences of the citizens of Country B embody social identity, however, and if the government of A takes into account the consequences of this for terrorism, it is not obvious that it will necessarily choose $X_A > 0$ as the optimal policy. Kroenig and Pavel (2012) suggest that the U.S.strategy of maintaining a presence on foreign soil would be a show of commitment of U.S. interests. However, the simulation in Figure 6 shows that this claim would be a misapplication of Schelling's (1960) logic when β is large enough, since A's payoff can go negative. The Kroenig-Pavel strategy may be even less tenable when social identity embodies altruism towards fellow citizens. We do not incorporate in our model the possibility that identity could range across countries. If shared religion or culture, for example, facilitates the formation or cementing of transnational identities, home-grown terrorism becomes a real possibility.[14] In cases involving cross-national identities, the Kroenig and Pavel strategy may become even less credible.

Figure 6: $W_A(\beta;\alpha)$ in SPE solution.

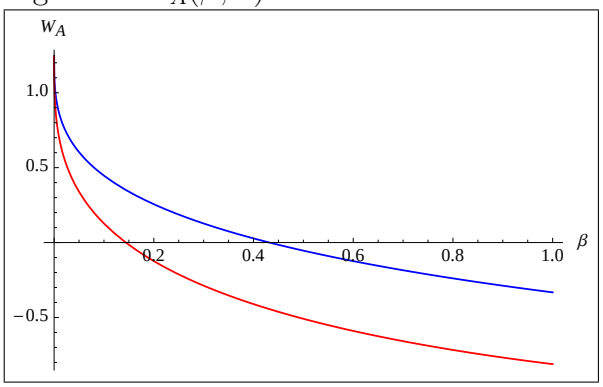
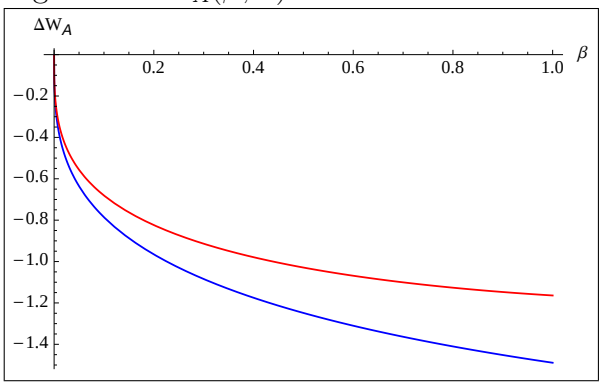


Figure 7: $\Delta W_A(\beta;\alpha)$ in SPE solution.



Finally, Figure 7 shows the effects on resource misallocation when A erroneously

[14]The London underground bombings of July 2005 are an example of this.

ignores the social identity of the citizens of B. For any pair of values (α, β) characterizing the true preferences of the citizens of B, suppose the government of A ignores these preferences and presumes that $\alpha = \beta = 0$. Clearly, by under-anticipating the terrorist response, A's invasion effort will be "too high" and its defensive effort into homeland security "too low". The actual terrorist response will be determined by the true values of the pair (α, β) and the level of A's invasion effort. Consequently, Country A will generally be under-prepared for terrorist attacks and the inflicted terrorist damage will come as a surprise. As a result the realized net benefit of invasion will differ from the net benefit anticipated in the misjudged subgame perfect equilibrium. The country acquires too much of the resource of B by invasion and pays an excessive penalty by way of terrorism it faces. The difference between the correctly anticipated net benefits and the net benefits when the situation is misapprehended is shown in Figure 7. The Figure shows, as a function of β, the misallocation of A's resources when the true value of altruism in B is $\alpha = 0.2$ but A fails to recognize this and presumes that $\alpha = 0$ while correctly assessing β. We see that, even if A correctly recognizes the degree of spite and hence anticipates some terrorism, the cost to it of ignoring the altruism component of social identity in B is increasing in β. This is because in-group altruism magnifies the effects of out-group spite.

5 Conclusions

Terrorism seems to be intimately connected with identity. Our premise in this paper is that a perceived assault on identity is an important instigator of terrorism, and we construct a model that isolates the explicit role of identity. Furthermore, we model terrorism as a decentralized phenomenon, as is consistent with much of contemporary terrorist activity. In standard models, terrorism cannot arise in a decentralized manner;

it requires state-sponsorship. Our model demonstrates how terrorism can result even when it is decentralized. Furthermore, we show that altruism towards in-group members magnifies terrorist effort (which, in a decentralized world) requires spite. We identify the costs incurred by target countries when they ignore identity considerations. Indeed, strategies against terrorism in standard models that may have been deemed credible are not necessarily so when identity considerations motivate terrorist actions.

What is abhorrent about terrorism is also its distinguishing characteristic, namely, the willingness to inflict damage to civilian populations to achieve the group's ends. However, identity certainly does not feature only in terrorism; it manifests more generally in serious conflicts between groups and, especially, in war. In the twentieth Century, the naval code among the Germans and the British alike evolved to the point that surrender in a battle was not an option. To die fighting with flags unfurled even when the odds of winning or of doing damage to the enemy are negligible became the expected norm (Afflerbach, 2012). Notions of the code of honor and service to the country are the concepts that were adhered to in the refusal to surrender. The Japanese kamikaze pilots in the Second War are examples of soldiers who engaged in suicide missions against the Allied Forces.[15] The reason frequently invoked was protection of family and country. Loyalty to country is generally seen as a supreme virtue. We suggest that concepts of identity can be usefully employed in the analysis of conflict and war, as has been recently recognized by Sambanis and Shayo (2013).

Finally, we mention that there is another issue that identity considerations may shed light on in future research. There is a presumption that governments should not give in to terrorists. There are good reasons for this position: giving in might set the precedent for a series of threatened terror attacks with an eye to gaining more concessions. However,

[15]Hill (2005) offers an interesting analysis of the role of culture and religion in such suicide missions.

there is another side to this. If the terrorism comes from a deep sense of an offense against identity, terrorist attacks may be retributions for perceived damage done to the militant group. If acts of terror are motivated by the desire to achieve what the terrorists deem as 'justice', they will stop once justice has been done. The motivation here is to restore a damaged sense of identity, not necessarily to garner more material concessions. In such cases, taking seriously the demands of terrorists may not be an invitation for a future flood of demands.

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